



FRIDAY, SEPT. 20

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Contributions.

Consumption of Fuel as Affected by Enginemen.

AURORA, Ill., Sept. 9, 1889.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In the *Railroad Gazette* of Aug. 30 a correspondent who signs himself "T" criticizes my letter on "Consumption of Coal as Affected by Enginemen," appearing in your paper of Aug. 2.

I am always glad to have mistakes pointed out, as I wish to be candid and correct. I feel sure, however, that the difference of opinion is due more to the different standpoints from which "T" and I regard the points of this discussion than to any material error on either side. "T" says that it would be anomalous for an engineer to use good judgment in getting his train over the road successfully and be careless of the coal consumption of his engine. I must differ from him on this point. I have had a somewhat varied experience in the cabs of locomotives on six of the large Western roads. I have fired for many different engineers, some of the most successful of whom, so far as handling their trains safely and promptly, were most extravagant in the use of fuel; indeed, regarding the amount of coal they used as of little consequence. I always thought, however, that the officers of the road were more to blame for wasteful operating than the men themselves. If the matter is not worth attention from officers, why should the men care?

My critic says that the necessity of a boiler full of water to start with is not, as I think, to have a supply of heat on hand that can be drawn upon in emergencies of hard work, but because the fire will not be in condition, at first start, to generate steam as fast as the engine will use it, with the injector supplying the boiler with an amount of water equivalent to what it is parting with as steam, so the injector must be left off until the fire gets to burning well. Now, what is the philosophy of this? Locomotives consume heat in performing work. Just so much heat is used to perform the work, regardless of whether the boiler is full or half full of water, or whether the injector is working or not. The fire must furnish the heat used. If the demand for heat is within the capability of the fire, all is well. If the demand is in excess of the capability of the fire, and there is no reserve store of heat to draw from, failure to maintain the steam pressure, and possibly failure to perform successfully the task, follows. Take, for illustration, a locomotive with 145 lbs. steam pressure, starting a train, and supposing it will use 400 lbs. of water (of 50 deg.) in forcing the train into speed and pulling it the first mile. If the boiler is supplied during the work with an amount of water equivalent to what it is parting with as steam, the fire must furnish 1,175 units of heat for each pound of water converted into steam and used. In running the mile the fire must furnish $(400 \times 1,175) = 470,000$ units of heat to the water in the boiler. If there is a sufficient quantity of water in the boiler at the start to allow of the injector being left off, so that no water will enter the boiler while the engine is running the mile, then the water in the boiler being already hot, 365 degrees, each pound of water as used need only be supplied with 856 heat units (the latent heat of steam of this pressure), and the fire would have to supply but $(400 \times 856) = 342,000$ heat units, or 128,000 units less than when an equivalent of water was supplied. The 128,000 heat units is the amount of heat the 400 lbs. of water absorbed in rising to the temperature of the water in the boiler under 145 lbs. pressure, and is the store of heat that has enabled the engine in the latter case to run the mile with a considerably less hot fire and therefore less coal consumption than was required in the former case.

In running the mile with the injector shut off the water level would fall about two inches in the water glass. So,

although my critic may never have thought of it while he was an engineer, the fact was, that when he filled his boiler full of water before starting, he laid up an immense store of heat, and when he ran the first one or two miles with his injector shut off, he drew upon that store for a large amount of the heat his engine used and relieved his fire of the task (possibly beyond its capability) of furnishing the same during the emergency.

The advantages of a boiler full of water to start with are not nearly so generally recognized by engineers as "T" appears to think. It is likely that upon roads using anthracite coal the necessity of having an abundant store of heat laid up to assist the engine in running the first mile or two, until the fire gets to burning well, is so imperative that engineers are compelled to recognize and utilize the advantage of the same; but upon roads using bituminous coal, which ignites quickly and in a few moments reaches its most intense and rapid combustion, a boiler full of water at start is not imperative, for the injector can be (and too often is) started with the engine, and, by forcing the fire, steam pressure maintained. But what engineers of hard-coal burning engines must do to get along at all, the engineers of soft-coal burning engines should do to save coal. The unnecessary consumption of coal resulting from their not doing so considerably decreases the net earnings of some roads.

"Another mistake that Mr. Baker falls into is the assumption that every engine that blows off steam must of necessity be consuming a certain amount of fuel with no compensating result." I confess that I am unable to see any compensating results when coal is burned to generate steam that is allowed to escape into the open air without having performed any useful work. Although I never had any experience in burning anthracite coal, I can appreciate the necessity of building up a heavy fire before starting, and of using the blower to get the coal heated to nearly the igniting temperature. But, granting this, popping is no less a clear waste of heat that should not be allowed if it is possible to prevent it. With a tank full of cool water, the temperature of which may, with perfect propriety and great advantage, be increased about 50 degrees, popping is unnecessary. The injectors in general use will work properly with the feed water heated to over 110 degrees, or unpleasantly warm for the hand, and it is but common sense if we have a surplus of heat, and a medium at hand that will absorb and hold it and give good return, that we should store it rather than waste it.

Such, at least, are the instructions on some of the Western roads, where economy of coal is receiving the attention it deserves. In proof of the assertion that popping is generally unnecessary, especially on soft-coal burning engines, I cite the following: Engine 36 of the Chicago, Burlington & Quincy, engaged in suburban train service between Chicago and Downers Grove, distance 21 miles, 15 stops, last time, made 50 consecutive trips in August without popping once. This was entirely due to the care of the engineer and fireman in the management of the engine. Engine 36 stands at the head of the coal list of the C. B. & Q. suburban train engines.

"T" asks how I am able to figure out, without knowing the area of the safety valve and the steam pressure, that an engine popping for five minutes wastes 447 lbs. of water. I will explain, as it may be interesting to others. A practical test was made on a locomotive, the cubic capacity of the water space in the boiler of which was known. A fall of one inch of water in the glass represented a decrease of 4 cub. ft., or 223.6 lbs. (at 365°) of water in the boiler. A hot fire stimulated by the blower sufficiently to cause the engine to pop continuously for four minutes, decreased the column of water 1.5 in., and, therefore, the quantity of water in the boiler $(1.5 \times 223.6) = 335$ lbs. This was at the rate of 84 lbs. of water per minute. An engine popping continuously for 5 minutes would waste $(5 \times 84) = 420$ lbs. (447 lbs. error) of water. This was a careful, practical test and verified former experiments and observation, and I believe an engine with an ordinarily strong pop wastes water at the rate of about 84 lbs. per minute in popping. I should be glad if others would make like experiments and tell the railroad fraternity of the results, as I believe it is a matter that has received too little attention, and is worthy of more.

"T" apparently thinks that more than six pounds of water may be converted into steam per pound of coal burned when an engine is standing. He is correct, and proves himself a sharp critic in picking me up on that point. We can get very good combustion in a fire-box when an engine is standing, and only the natural draft acts on the fire; because of which and the slow motion of the hot gases of the fire from the fire-box and through the flues, giving ample time for the transmission of their heat to the water in the boiler, we are able to absorb nearly the entire amount of heat generated by the fire. To this fact is due, in a great measure, the economical advantage of a boiler full of water to start with. The store of heat can be laid up cheaply while the engine is standing before the start, and helps out greatly when, but for it, the fire would have to be forced beyond economical limits.

"T" says there would be some satisfaction in knowing more of the facts in connection with the records given of engines A, B, C and E. I will simply say that they are the records of different engines run by the writer on different divisions of the Wabash Railroad, compared with the performance of all other engines of same size, in same service on same division. The figures given are correct copies from the records in the Master Mechanic's office. All engineers concerned knew a careful record of the coal consumption of their engines was being kept, for the same was posted up for their inspection each month. The engines were, generally speaking, all in good condition, and with equally careful management should have approached closely the economy of engines A, B, C and E.

GEORGE H. BAKER.

Brakes on Engine Trucks Again.

53 BROADWAY, NEW YORK, Sept. 16, 1889.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Your article in last week's *Railroad Gazette* further confirms the practicability as well as the necessity of placing brakes upon the engine trucks; and now that it has been so publicly stated, with all the authority of the *Railroad Gazette*, the object of my communication has so far been accomplished. But I must ask you to be good enough to remove the undeserved imputation of unfairness and injustice thrown upon me in your last week's article, when dealing with my remarks upon the design of the engine truck. It seems to me I have been unfairly construed; the remarks were not dictatorial, but were purposely made in the form of a suggestion, as will be readily seen upon a perusal of them.

I would like also to dispel the lingering doubt, of which there is still a trace in the article alluded to, as to whether the gain obtained by the application of a brake to the engine truck compensates for the extra complication and increase in number of parts necessary to secure it. It might be that this question could be more pertinently asked of the compound locomotive now rising into favor; but a properly constructed engine truck brake is—and must be to be successful—the acme of simplicity; there is no complication about it. Complication can only exist where parts are involved or where more parts are introduced than are necessary to accomplish the desired object; and as to interfering with truck inspection, or being in the way when attention to the truck's mechanism may be required upon the road, the truck brake that I have contended for does neither of these things, but I admit that there is a reason for your stricture if the engine truck brake be such as is described in your article as consisting of brake cylinder and reservoir with its triple valve, flexible connections, brake beams, levers, fulcrums, hangers and attachments, applied solely to the engine truck; surely this is not the brake of which you say "there can be no danger so long as the brake apparatus is arranged according to our best knowledge of the subject at the present time."

As to the value of the extra power gained by its use, I tried to show this in my last communication, but by what I suppose was an oversight on the part of your proof-reader a whole sentence was omitted. That sentence referred to the fact that the value of an engine truck brake was unfairly estimated when given in percentages of brake on train when no weight or number of cars are given. The reason why this is so was given in the following words: "An engine hauls such various loads, and often has to run with one or two special cars or even with no cars at all." This whole sentence was omitted, and thus the principal reason for the desired alteration in estimating the value of engine truck brakes did not appear. It is evident that when the estimate is made under the above conditions, instead of being four or five per cent. of gain, it may rise as high as 30 per cent.

When you propose to look for an equivalent for the increased brake force an engine truck brake would give in improved car brakes, you miss the point of the whole question. What we are contending for is the thorough efficiency of our brake system, and this can never come to pass with some wheels braked and some unbraked. Present brake practice places the proper brake shoe pressure somewhere between 70 and 80 per cent. of wheel weight; let the car brakes be brought up to this standard of efficiency and extend it to the load as soon as possible; but after you have done all this, how can the system be called efficient that leaves 30 per cent. of the weight of the heaviest vehicle in the train totally unbraked?

JAMES HOWARD.

Beach Protection.

In these days, when the reporters have painted in orthodox gore the story of disasters along the coast, much of which is a sad reality to railroad corporations and other investors of capital, perhaps a brief exposition of the theory of protection against storm wash and of beach reclamation may be useful. Flood tides, the usual cause of damage, as aggravated by storms, which are positive waves, differ from ebb tides, which are negative waves, in that they tend to loosen and transport beach sand along and towards the shore, while the ebb tends both to remove suspended sand and to consolidate the bed. A ledge will have a firm hold at ebb tide where it drags at the flood.

Tides do not strike squarely on the coast. On the southern beach of Long Island there is a powerful westerly trend, so much so that in one case, at Rockaway Beach, a sand spit was gradually formed, and carried about $\frac{1}{4}$ miles, several hundred feet wide, westward along and parallel with the beach, leaving a wide, intervening channel until the main beach was intersected. Along the New Jersey shore the trend is northerly, Sandy Hook having traveled more than $\frac{1}{4}$ miles north since 1790.

Waves approach the beach with two radically distinct modes of motion. The great ocean tidal wave moves by successive, nearly vertical displacements, so as not to produce currents corresponding to its enormous velocity and power. Under this law the flood swells approach a beach until this motion is arrested by a certain shoaling depth, when they become waves of translation, charged with the *vis viva* due to each, striking the beach or any opposing obstacle, with an impact proportional to their weight and speed, as it may be aggravated by outside and inshore wind pressure.

Half-flood observations at Asbury Park have shown waves of 7 to 13 seconds interval, averaging 9; three crests in motion within 900 ft.; outer crest height, about 7 ft.; inner, $4\frac{1}{4}$; mean velocity of translation, $83\frac{1}{2}$ ft. per second; quantity in motion, about 75 cu. ft.; actual slope delivery, about

15 cu. ft.; about 53 H. P. per foot face, or 259,630 H. P. per mile of beach. This is only an ordinary display of force, as there are times when special storm waves strike with not less than 60 lbs. per sq. in. Solid rock may resist this impact, but the conflict tells even on trap and granite, as every traveler can see; and among marine engineers, for light-house and other exposed structures, only large expenditures made with utmost care and skill are admissible; while the mistake of attempting to oppose ordinary and comparatively cheap structures to flood wave impact is fully understood.

Every one familiar with surf bathing knows that there is a great difference in comfort inside or outside of actual breakers. In one case the swells still act as displacement waves, lifting and dropping as they sweep in, but when the foot is so impeded in depth that the head overtops it, it becomes a translation wave, and one must dive through it or stoop down into solid water to let it pass over or be driven shoreward.

Nature, the mother of sensible engineers, has established a law of shore protection which is as simple as it is grand, and this is a flat, sloping sand beach. Such a slope shoals and breaks the waves before they reach the shore, and thus exhausts their striking and abrading power.

If, then, a shore must be thus protected by meeting the waves before they reach it, and there is no resistance like beach sand on a properly flat slope, the first care must be to form such a beach by structures which will act between low and high tide levels so as to break the breakers and accumulate and hold their charges of sand. Such structures must be founded and held in solid water, submerged, and forming eddies and lees for sand deposit, and must be adapted in form, construction and location to the special conditions of service.

An illustration of a positively wasteful structure, protected in part by this action, and in part only, will be found in the bulkhead and jetty system in front of the Oriental Hotel, at Manhattan Beach. Along this front a long, somewhat concave bulkhead has been built, to a height considerably above high-water line, with three rows of substantial piles, close together, rows about ten feet from centres, well braced and carefully filled in with riprap. A short experience with it led to the construction of a series of jetty spurs at intervals of about 400 ft., about 8 ft. wide, in two close rows of piles, carefully filled in with riprap, and cut off below or about high-water line.

If the trend of the sea was square with the bulkhead these jetties would be of little use, but as it is diagonal, their easterly faces and ends tend to break the waves before they reach the bulkhead, and also to collect sand with a similar effect between jetties. During the late storm they have remained substantially intact, but every movable part of the bulkhead stringers, braces, beams, floor, etc., has been torn away, and the riprap fill much undermined. Obviously the jetties need further extension seaward with L returns westward at the ends. Properly formed they can be made natural beach formers and save a very large annual expenditure for repairs.

The successful manner with which English and Dutch engineers have protected very much exposed sea fronts, in view of the great annual expenditures for repairs on some of our own coasts ought to lead to a careful study of proper appliances.

SAMUEL McELROY,
Civil Engineer.

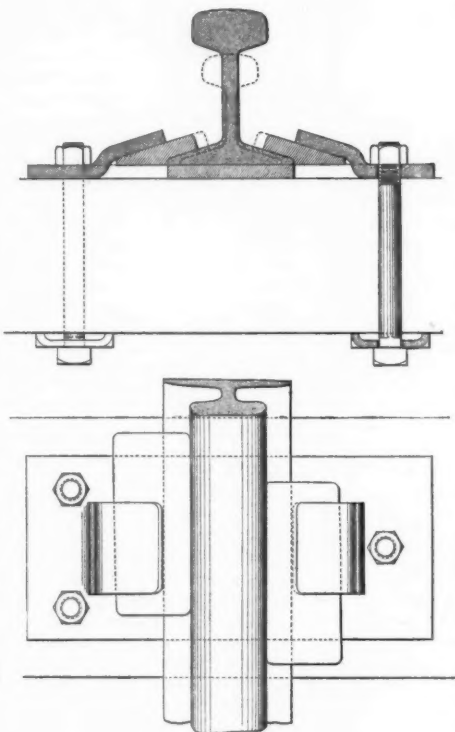
Sandberg's Steel Base Plate for Flange Rails of Different Sections.

The new Goliath rail designed this year has, in addition to a wider head, been given a narrower flange, with a view to the use of steel base plates. The weakest part of a road using flange rails is the insufficient fixing of the rail to the sleeper, as well as the short life of the sleeper itself, the rails outlasting several sleepers since steel has come into use. Every year the wood used for sleepers is becoming of sorer texture, and consequently does not last so long as formerly, and the frequent renewal of sleepers now forms the largest item in the maintenance of a permanent way, particularly where flange rails are laid direct upon the sleepers, the bearing surface being much too small in any section that can be easily rolled to prevent the rail sinking into the sleeper.

The width of the rail flange varies from $3\frac{1}{2}$ to $4\frac{1}{2}$ in. for a 50-lb. to a 70-lb. section up to 5 in. for the 100-lb. Goliath. Rails have been made with extra wide flanges, such as 6 in., and even $6\frac{1}{2}$ in., but with great difficulty and at an increased cost. With an 8-in. flat surface of sleeper this would give a bearing of from 28 sq. in. to 40 sq. in.; but wooden sleepers often are cut semi-circular, the flat surface in the ballast, thus reducing the actual bearing surface to about one-half. The increased weight of rolling stock and the higher speed rapidly crush the flange into the sleeper, prematurely destroying it, and interfering with the gauge of the road. Fir sleepers creosoted will last only seven to eight years, and the introduction of steel sleepers wherever wood is dear has become a radical remedy and a source of great saving in many countries; but there are circumstances where the cost of steel sleepers will not balance with that of wood, and where the increase of duration of the latter through an extended bearing surface would be desirable, and as such increase cannot be obtained through the increased width of the rail flange to anything like the extent wanted, the introduction of base plates seems inevitable, if roads using flange rails are to come up in safety and economy to those in England using bull-headed rails and cast-iron chairs. But these chairs have about 100 sq. in. bearing surface on the sleeper, and under these conditions the sleeper lasts nearly twice as

long as when the rail is laid directly on it. The chair is fixed by large fang bolts of, say, $\frac{3}{4}$ to $\frac{1}{2}$ in. diameter. The base plate should have these two conditions: as large a bearing surface and as firm a fixing to the sleeper as the chair, in order to obtain equal results.

With this view a steel base plate has been designed, of 7 in. \times 16 in. \times $\frac{1}{2}$ in., giving a bearing surface of 112 in.



and offering the same mode of fixing as the chair. Both conditions, of course, may be modified according to circumstances, such as the size of sleepers most conveniently obtained, climatic influence, and each engineer's fancy for fixing. Seeing that the rail can only give from 30 to 40 sq. in. bearing, a treble bearing surface by using this base plate should at least double the life of the sleeper.

The rail is fixed to the base plate by steel keys, in clips offering a surface of 8 in. wide, instead of $\frac{1}{2}$ in. spikes or screws, enabling a quick change of sleeper to be effected when necessary without removing the rail, the fixing of the base plate to the sleeper being done beforehand, as with the chair.

The tilt of the rail to 1 in 20 can, if needed, be obtained by several means: by cutting an inclined top surface on the sleeper, by bending the plate for the rail base, or by rolling the plate for the rail base of different thicknesses. The rail joint would be suspended by angular fish plates, which offer sufficient bearing surface to the joint sleepers, so that the base plates would only be needed on intermediate sleepers.

The base plates now in use, say 7 in. square (49 sq. in.), are much too small for the object for which they are designed, and, what is worse, require nicety in the position of the spike holes, even to $\frac{1}{32}$ of an inch, to be thoroughly effective, and that is very difficult to obtain in practice.

The new plate might even be applicable to rails with flanges varying from 4 to 5 in. wide, that is, rails weighing from 56 to 100 lbs. per yard, different steel keys being the only stock necessary for different rail sections. This is shown in the drawing applied to the 56-lb. standard section (of which more than half a million tons have been made), and to the new Goliath of this year, weighing 100 lbs. per yard. The plates can thus be manufactured for stock, and thereby obtained cheaper, becoming a standard base plate.

The cost compared with the chairs for the bull head would still be somewhat less. The cost of the iron chair weighing 40 to 50 lbs. is about £3 per ton taken at normal prices, and the base plate weighs 16 lbs. and would probably cost £6 per ton, so that the plate weighs about one-third of the chair and costs double the price per ton, thus representing a saving of one-third as compared with the cost of chairs.

The base plate would be applicable to any existing circumstances at once as the exchange of sleepers goes on. As it is only 16 lbs. in weight as against 50 of the chair, the elasticity of the road would not be impaired by laying them singly or gradually, and a good effect would be at once felt in keeping the gauge even when two or three sleepers with base plates were introduced on each rail on the road. Considered from all points, the introduction of base plates for safety in keeping the gauge and economy in doubling the life of the sleeper is to many roads of more vital importance than even increasing the weight of the rail, for this latter can be only a question for the main lines, and for many companies be introduced very slowly, indeed; while the benefit of doubling the life of the sleeper through application of base plates would be felt at once even on branch lines.

The objects sought by all railroads using flange rails ought to be to come up to the perfection of the English road using bull-head rails and cast-iron chairs, and this cannot be obtained without the application of steel base plates and an increased weight of rail to correspond with the rolling stock and speed. But to go by degrees the base plate seems to be

the first step necessary to adopt, and it touches not only the safety of the line but also the most important daily outlay, that is, the renewal of the sleepers. Besides, it would save the forests and also be a medium between the adoption of steel sleepers and the laying of rails direct on the wood sleepers.

Models of the standard base plate as applied to Sandberg's 56-lb. and 100-lb. rail sections, only using different keys, are now being exhibited in the Machinery Hall, class 61, in the Paris Exhibition.

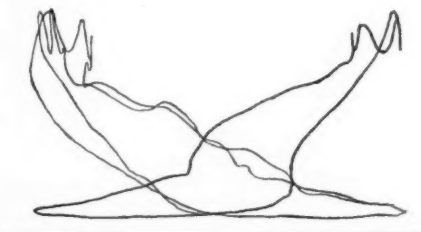
C. P. SANDBERG.

Indicating Locomotives.

Any discussion by experienced men concerning the details of this subject are of great value. For this reason I have found interesting the articles in your columns by Messrs. Lyne and Manning.

The indicating apparatus described by Mr. Lyne is the same which was illustrated by him several years ago, and is defective in several particulars. It is complex in detail, inexact in its reduction, and very defective in its accomplishments. At high speeds it will spring; the cord, which is necessarily long, will stretch, and thus elongate the diagram beyond its normal dimension. Moreover, this lengthening is not uniformly distributed, but is erratic. Diagrams made with such a device are frequently $\frac{3}{4}$ of an inch longer when taken at 300 revolutions per minute than when taken at starting. This is not a permissible error.

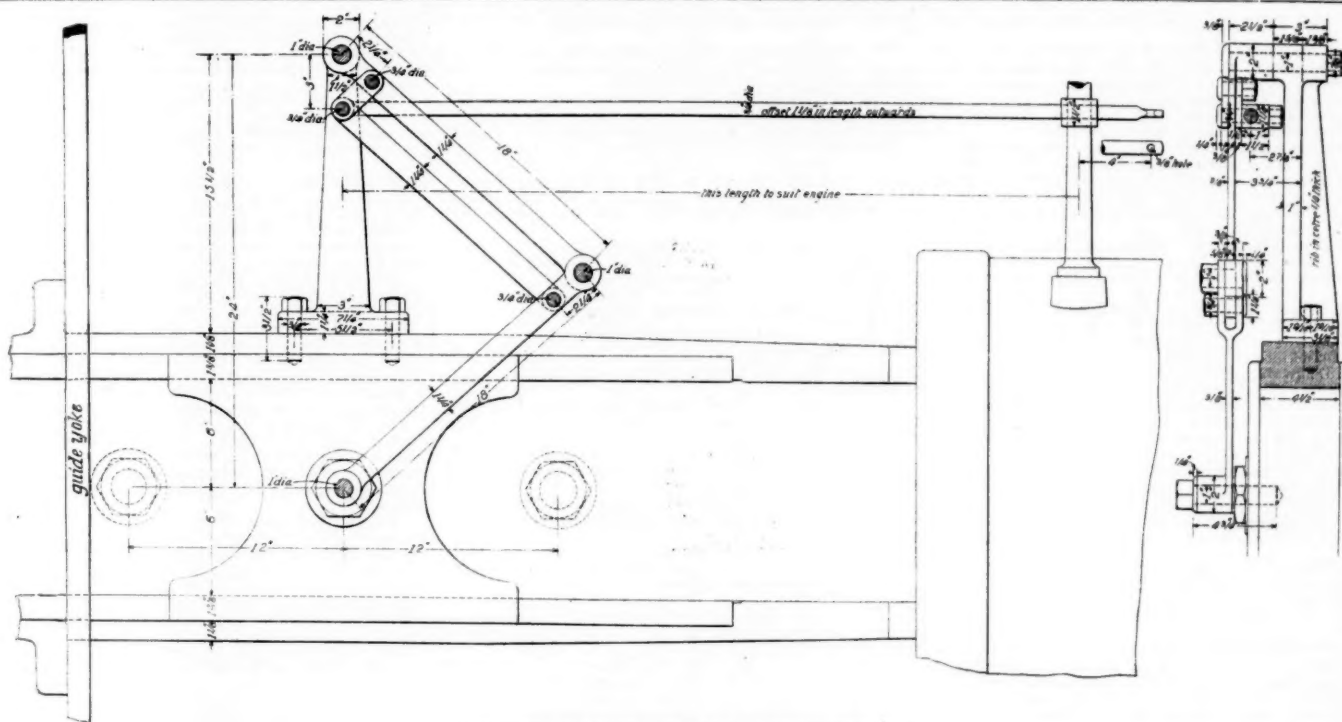
The faults just enumerated, however, are not the worst with this device. As the cord is long and cuts the air somewhat transversely, it is at high speeds (particularly if there is a head wind) thrown into violent transverse vibration at frequent intervals. The indicator drum is therefore rotated irregularly, and the diagram bears but little resemblance to the proper form. I here reproduce one of several diagrams taken by myself when the cord was in vibration. It is an extreme case, but shows that a diagram can be very much distorted in this way.



This experience naturally caused scheming to overcome this and all other defects. It was evident that a short cord was necessary, and that its direction should be horizontal in order not to cleave the air transversely. Besides, it was important that the device should be made of short pieces, without connection with the running-board, in order to minimize spring. Furthermore an absolutely accurate motion to the indicator drum was desirable. All of these qualities, it was seen, could be secured by using a pantograph motion with a transmitting rod running forward through a guide, directly to the cord of the drum. Upon my advice, Mr. Geo. S. Strong applied such a device to locomotive No. 444 of the Lehigh Valley Railroad with perfect success, and it is safe to say that no other contrivance should be used for this purpose. The cord was about 8 in. long, and the evils of stretch were thus nearly eliminated. All diagrams were of almost identical lengths, no matter what the speed. As the pantograph gives no up and down motion to the end of the transmitting rod, there is no error from obliquity.

The apparatus consists of a parallel motion, one end of which is attached to a bracket on the top guide, and the other secured to the wrist pin of the cross-head. The dimensions of the parallelogram of the parallel motion are such that the distance traversed by one of the joints is equal to the desired length of the indicator card when the end attached to the cross-head moves through the length of the stroke. From this joint a $\frac{3}{4}$ -in. round rod of steel passes to a bearing on the cylinder, as shown. All details of the design will be clearly understood after an inspection of the illustration.

Regarding the arrangement of the pipes for conveying the steam to the indicator, and the position of the operator, I have been much impressed with the danger to which the latter is exposed. The possibility of a collision of engines, meeting a cow, pig, or even a chicken, or being struck by a switch stand, are slight in comparison with that of being annihilated by a piston coming through the front cylinder head, or by the blowing out of a cylinder head, or by an explosion of a steam chest. These latter accidents are so frequent that they should not be ignored by the most heedless person. An arrangement of seat and pipes can be made that will to some extent render these accidents, except the explosion of the steam chest, harmless. This can be accomplished by placing the indicator above the steam chest and having an elevated seat for the operator, covered with sheet iron underneath, and formed so as to allow an unobstructed passageway for the piston or head, if either should come out. Naturally, a cylindrically formed seat will suggest itself, and the operator could sit upon this, as he would upon a horse, and with quite as much comfort. The supports of the seat should be so placed that they would not be likely to be struck by the displaced parts. The pipes should enter the side of the cylinder instead of the heads in order to prevent displacement and injury to the indicator, broken fingers, etc., if the heads should leave their fastenings. They should be well clothed with non-



INDICATOR RIGGING.—STRONG LOCOMOTIVE CO.

conducting material, as short as is consistent with the object sought by the position of the indicator, and located so as to drain quickly. F. W. DEAN.

CAMBRIDGE, Mass., Sept. 4, 1889.

Train Accidents in August.

COLLISIONS.

REAR.

2d, on Southern Pacific, at Saugus, Cal., a freight train ran into the rear of a preceding freight, damaging engine, caboose and several cars.

3d, on Boston & Maine, near North Conway, N. H., a passenger train ran into a work train standing on the main track, wrecking the engine and baggage car and derailling several other cars. One trainman, a man riding in the baggage car, and a boy on the work train were injured. The regular engine of the passenger train had been disabled and its substitute had no air brake.

4th, on Rome, Watertown & Ogdensburg, at Wolcott, N. Y., an excursion train ran into the rear of a construction train standing on the main track. Engine and caboose damaged and several cars derailed. It appears that the work train had no flag out.

5th, on Chicago, Burlington & Quincy, at Dudley, Ia., a freight train ran into the rear of a preceding freight, wrecking engine and 12 cars. Engineer and fireman injured.

5th, on Chicago, Burlington & Quincy, at Melrose, Ia., a freight train broke in two, and the rear portion ran into the stopped forward section, wrecking 3 cars.

5th, on New York, Pennsylvania & Ohio, at Portage, N. Y., a freight train ran into the rear of an accommodation train, doing some damage. Two trainmen injured.

6th, on Western New York & Pennsylvania, at Eldred, Pa., a freight train ran into a construction train, doing considerable damage. Three laborers injured.

6th, on Chesapeake & Ohio, near Dunlap, Va., freight train ran into the rear of a preceding freight which had broken in two.

8th, on New York, Chicago & St. Louis, at South Whitney, Ind., a freight train broke in two, and the detached sections collided, doing considerable damage. A tramp stealing a ride was killed.

9th, on Lehigh Valley, at Penn Haven Junction, Pa., a locomotive derailed into and wrecked a caboose standing on a siding. One trainman in the caboose was killed and another injured. It is stated that the runner of the engine was asleep, and failed to notice signals.

10th, on Northern Pacific, at Yelm, Wash. Ter., freight train ran into a switching work train. Engine and 6 cars wrecked.

10th, on Rome, Watertown & Ogdensburg, at Forest Lawn, N. Y., a local passenger train, whose trip was to begin at Forest Lawn, was standing at the station taking in passengers, when it was run into at the rear by an express not timed to stop at this station, which approached at high speed. Three passengers killed and 6 injured. The express was about 1 1/2 hours behind time. It does not appear whether the standing train neglected to put out a flag or the express neglected to properly reduce its speed.

10th, on Kansas City, St. Joseph & Council Bluffs, at St. Joseph, Mo., a freight train ran into the rear of a preceding freight which was stalled on a grade. Engine, caboose and 20 cars wrecked. One trainman injured and a man riding in the caboose killed.

11th, on Chesapeake & Ohio, at Iron Gate, Va., freight train ran into the rear of a preceding freight, which had stopped, but had not sent out a flag. Engine and 5 cars damaged.

12th, on Duluth, South Shore & Atlantic, at Negaunee, Mich., freight train ran into a preceding freight which had been stalled on a grade, wrecking caboose and 1 car and disabling the engine.

14th, on Philadelphia & Reading, near Hamburg, Pa., passenger train ran into the rear of a freight train standing on a curve. Engine damaged and caboose and 6 cars wrecked.

14th, on West Jersey, at Vineland, N. J., a freight train broke in two and the detached sections collided, wrecking 2 cars. One trainman and a boy stealing a ride injured.

15th, on Pittsburgh & Lake Erie, at Saw Mill Run, Pa., a switching engine ran into some freight cars standing on the main track, wrecking a number of them.

16th, on Pittsburgh & Lake Erie, near Pittsburgh, Pa., a string of runaway freight cars collided with some cars standing on a siding at the foot of the grade, wrecking 4 cars.

16th, on Chicago, St. Louis & Pittsburgh, near Columbus, O., a freight train which had stopped to do some switching, leaving the rear portion standing on the main track, was run into by a following freight, wrecking engine, caboose and 5 cars. A drover asleep in the caboose killed, 2 trainmen injured.

17th, on Chicago, Rock Island & Pacific, at Wabash Junction, Mo., a passenger train standing at the station was run into by a following freight train, damaging the rear sleeper. Two passengers and an express messenger injured.

19th, on Northern Central, near Baltimore, Md., in order to avoid collision between an incoming express train and a locomotive obstructing the main track, the runner of the latter reversed and then leaped from the engine. The engine, which ran at high speed through the yards, was finally turned on to a side-track containing a string of freight cars, a number of which, together with the locomotive, were badly wrecked.

20th, on New York, Lake Erie & Western, near Big Flats, N. Y., a freight train detained by the wreck of a south-bound freight was run into at the rear by a passenger train, wrecking caboose and several cars and overturning the engine. Four trainmen and a drover injured. Two of the passenger cars were considerably crushed and a number of freight and baggage cars were burned up. The fire would have been more extensive except for the efforts of the passengers.

20th, on Philadelphia & Reading, near Pleasantville, Pa., a freight train broke in two and the detached section was run into by a closely following freight and afterward by the forward portion of its own train in returning to recouple, damaging an engine and several cars. Engineer injured.

20th, on New York Central & Hudson River, at Tribes Hill, N. Y., a light engine ran into the rear of a stock train, doing some damage.

21st, on St. Louis Bridge & Tunnel road, in St. Louis, Mo., a freight train broke into four parts, which afterward collided, doing considerable damage.

21st, on Savannah, Florida & Western, near Savannah Ga., a freight train ran into a preceding freight. Engine disabled and 3 cars derailed and damaged.

22d, on Chesapeake & Ohio, near Stone Bridge, Va., freight train ran into the rear of a preceding freight, damaging engine and 3 cars. The forward train had not time to send back a flag.

24th, on Chesapeake & Ohio, at Cotton Hill, W. Va., freight train broke in two and the two portions afterward collided, wrecking 2 cars.

24th, on Pennsylvania road, near Harrowgate, Pa., a freight train ran into a preceding freight which was stalled on a grade, disabling the engine, wrecking caboose and 1 car and derailling a number of others.

27th, on Union Pacific, at Chapman's, Neb., a passenger train ran into the rear of freight train going on to a side-track, disabling the locomotive and damaging a caboose and 3 cars.

27th, on New York, Lake Erie & Western, near Adrian, N. Y., a freight train broke in two and the detached portion came in collision both with its own train and a following freight, doing considerable damage.

29th, on New York, Pennsylvania & Ohio, at Cleveland, O., 5 runaway freight cars, in order to prevent collision with an approaching passenger train, were turned on to a siding by an alert switchman and dashed into some standing freight cars, doing considerable damage.

29th, on Lake Shore & Michigan Southern, at Geneva, O., freight train ran into a preceding freight. Three cars were wrecked and burned.

29th, on Texas & Pacific, near Longview, Tex., a freight train ran into a preceding passenger train which had stopped at a water tank. Several cars derailed and damaged.

29th, on New York & New England, near Brewster, N. Y., a freight train ran into the rear of a standing freight. The wreck caught fire from the engine, burning 10 cars.

30th, on Chesapeake & Ohio, at Dunlap, Va., freight train ran into the rear of a preceding freight which had broken in two. Engine was overturned and a number of cars badly damaged.

30th, on New York & New England, at Norfolk, Mass., an express train ran into the rear of a local passenger train, doing some damage. There was a dense fog at the time.

30th, on Central of New Jersey, near Easton, Pa., a switching engine moving backward collided with some freight cars, doing some damage. Of four boys riding on the tender one was killed and the others injured.

30th, on Chicago & Northwestern, near Elmhurst, Ill., a passenger train was run into at the rear by a light engine, damaging the rear car and injuring 7 passengers. There was a dense fog.

BUTTING.

1st, midnight, on New York & New England, near New Britain, Conn., butting collision between an east-bound passenger train, about three hours late, and a west-bound freight, badly damaging both engines and wrecking several cars. Three trainmen injured. The freight was running on the passenger train's time without leave.

1st, on Baltimore & Potomac, at Lorton, Va., butting collision between a regular south-bound passenger train, running in violation of orders, and a north-bound passenger train, consisting of engine and one coach. Both locomotives wrecked. One trainman killed, 2 trainmen and 1 passenger injured.

3d, on Chesapeake & Ohio, near Mechum River, Va., butting collision between freight trains, piling up both engines and a number of cars in a very bad wreck in a cut. One of the trains forgot that the other one was on the time-table.

3d, on Burlington & Missouri River, at 24th street, Omaha, Neb., butting collision between passenger train No. 3, going west, and an engine and caboose moving east. The freight engine was running on the passenger train's time, having failed to examine the register at South Omaha. Flagman Gardner, who was on duty at the street crossing, heard both trains approaching and succeeded in flagging both just in the nick of time, so that the damage to the engines was slight. A curve in the road made the view for both engineers short, and the collision would have been serious but for the flagman's alertness.

4th, on Virginia Midland, at Burnleys, Va., butting collision between two freights, one of which had neglected to stop at the preceding station for orders. Forward portions of both trains wrecked. Two trainmen killed, 4 injured.

5th, on Philadelphia & Reading, near Jenkintown, Pa., butting collision between a passenger train and an empty engine, which, owing to disarrangement of its whistle, could not be controlled. Both locomotives and several cars damaged.

6th, on Lake Shore & Michigan Southern, near Youngstown, O., butting collision between two freight trains, disabling the engines and damaging several cars. One train was running in violation of orders.

6th, on Philadelphia & Reading, at Preston Junction, Pa., butting collision between two coal trains on a heavy grade. The shock of the collision opened the throttle of one of the engines, whose cab had been deserted just before the trains came together, and the train at once started back down grade and ran at high speed to Mahanoy Plane, 3 miles, where it was turned on to a siding and dashed into a train of loaded coal cars, wrecking 29 cars.

6th, on Pittsburgh, Cincinnati & St. Louis, at Boyce's Station, Pa., butting collision between a passenger train and an inspection train, doing some damage. One passenger injured.

7th, on Richmond & Allegheny, near Scottsville, Va., butting collision between a passenger train and a freight. Both engines and a number of coal cars wrecked. Conductor of passenger train killed, brakeman injured.

8th, on Chicago & Alton, at Lincoln, Ill., butting collision between two freight trains.

8th, on Louisville & Nashville, near Hartsville, Ala., butting collision between two freight trains, doing some damage.

9th, on New York, Philadelphia & Norfolk, near Salisbury, Md., butting collision between a southbound passenger train and a northbound freight train, damaging both engines. One trainman injured.

11th, on Chicago, Rock Island & Pacific, near Topoka, Kan., butting collision between a freight and a passenger train on a curve. Both engines, baggage and express cars and a number of freight cars wrecked. One trainman killed, 2 injured.

11th, 6 a. m., on Philadelphia & Erie, at Whistletown, Pa., butting collision between freight trains, wrecking both engines and 25 cars, many of which were burned. One brakeman killed. It is said that the operator at Johnsonburg neglected to hold the eastbound train.

12th, on Pennsylvania, at Moorestown, N. J., butting collision between two passenger trains, injuring 2 trainmen and 3 passengers. The trains had orders to meet at this station, but the westbound came in at uncontrollable speed.

13th, on Northern Central, at Starkey, N. Y., butting collision between a northbound freight train and a switching freight, damaging the engines and derailling several cars. Brakemen injured.

15th, on Boston & Albany, near Zylonite, Mass., butting collision between a runaway car and a passenger train. One passenger slightly injured. The car was loaded with coal and, having a poor brake, had escaped from a station several miles up the grade, where it was being moved by hand.

The passenger train had stopped and was moving backwards.

20th, on New York, Lake Erie & Western, at Big Flats, N. Y., a westbound freight train ran into a standing eastbound freight, which had been run upon the north track to give way for an eastbound passenger train. Several cars were wrecked and the engine badly damaged. Engineer injured. The wreck obstructed the south track.

22d, on Chicago, Milwaukee & St. Paul, near Alton, Ill., a freight train descending a grade broke into three parts and the foremost portion in evading the middle section, on which there was no brakeman, ran into the head of a freight train standing in the Elgin yard. Two engines and several cars damaged. Tramp killed.

22d, on Evansville & Terre Haute, near Evansville, Ind., butting collision between two freight trains, due to a confusion of orders. Both engines wrecked. One trainman injured.

22d, on Oregon Railway & Navigation Co.'s road, near Meacham, Ore., butting collision between two freight trains, one of which was drawn by two engines, making a bad wreck. One trainman killed, 4 injured.

23d, on Delaware, Lackawanna & Western, at Newark, N. J., butting collision between an excursion train and a freight train, damaging both engines and several cars.

23d, on Baltimore & Ohio, near Petroleum, W. Va., butting collision on a sharp curve between passenger train No. 671 and an officers' train (second 646), consisting of engine and one car, on a tour of inspection. Both trains were running at speed, and the engines and a baggage car were badly wrecked. Four trainmen killed, an officer of the road, two trainmen and two passengers injured. The conductor and engineer of No. 671, both experienced men, misread an order.

23d, on New York, Lake Erie & Western, at Alden, N. Y., butting collision between a Lehigh Valley excursion train and an Erie freight. Fireman killed by leaping from the engine. The engineer of the passenger train is said to have been asleep.

26th, on Pittsburgh, Cincinnati & St. Louis, near Coshoc-ton, O., butting collision between a passenger train and a freight just pulling out of a siding. Both engines damaged.

28th, on Southwestern, at Adams, Ga., a freight train ran over a misplaced switch and into the head of another freight standing on a siding, damaging both engines and several cars. One trainman injured in jumping.

29th, on New York Central & Hudson River, at Buffalo, N. Y., butting collision on a curve between a Lake Shore & Michigan Southern passenger train and a New York, Chicago & St. Louis switching engine. The throttle of the switching engine was opened by the shock, and its cab having been deserted just before the crash, it started and ran back some distance through the yard and into an engine standing on a turn-table. All three engines badly damaged. Four trainmen injured.

29th, on New York Central & Hudson River, at West Albany, N. Y., butting collision between a freight train and a switching engine, due to a mistake in signals. Engines and 4 cars damaged.

29th, on Western New York & Pennsylvania, at Colegrove, Pa., butting collision between two freight trains, wrecking the engines and 15 cars. One trainman killed, 1 injured.

30th, on Central Vermont, near Middleburg, Vt., butting collision between a passenger train and a freight, making a bad wreck. Two trainmen killed.

30th, night, on Central Vermont, near Brooksville, Vt., butting collision on a curve between an excursion train and a freight train. Both trains were running at speed and the engines, 2 passenger cars and 10 freight cars, loaded with hogs, were badly wrecked. Three trainmen killed, 3 trainmen and 2 passengers injured. The freight neglected to wait at the preceding station for the passenger train.

CROSSING AND MISCELLANEOUS.

2d, at Kenwood Junction, N. Y., a southbound Delaware & Hudson Canal Co.'s passenger train ran into the site of a northbound West Shore passenger train, overturning and damaging three cars. One passenger killed, two trainmen and 12 passengers injured.

3d, on Alabama Great Southern, at Birmingham, Ala., collision between a freight train and an empty engine, doing slight damage.

5th, on Chesapeake & Ohio, at Fayette, W. Va., a freight train leaving the station broke in two and the rear portion ran back and into the side of another train which had just been met. Five cars derailed.

13th, on Philadelphia, Wilmington & Baltimore, at Media, Pa., an extra freight train ran into the side of an empty switching passenger train. Engine and two coaches damaged.

15th, at the crossing in Goodland, Ind., collision between Pittsburgh, Cincinnati & St. Louis and Chicago & Indiana Coal Road freight trains. One trainman killed, two injured.

17th, near Kansas City, Mo., collision between Missouri Pacific and Kansas City, Wyandotte & Northwestern freight trains, doing slight damage.

27th, at the crossing in Chicago, the rear sleeping car of a Chicago, Santa Fe & California passenger train was run into, thrown off its trucks and badly damaged by a Chicago, Rock Island & Pacific switching freight, which approached the crossing at uncontrollable speed.

29th, on New York Central & Hudson River, in Buffalo, N. Y., the rear sleeping car of an eastbound West Shore passenger train was run into and considerably damaged by a Rochester & Pittsburgh switching engine, moving backwards. Two passengers injured.

31st, at the crossing near Fremont, Neb., an eastbound Union Pacific freight train ran into a Fremont, Elkhorn & Missouri Valley freight, derailling 14 cars. A tramp was killed and another injured.

DERAILMENTS.

DEFECTS OF ROAD.

2d, on Eastern of Minnesota, at Duluth, Minn., 2 cars of a passenger train thrown from the track by a broken rail.

6th, on Union Pacific, near Weston, Neb., two engines and the forward portion of a freight train broke through a bridge which had been weakened by heavy rains, and were wrecked. Two trainmen killed and 3 injured.

8th, on Louisville, New Orleans & Texas Pacific, near Coahoma, Miss., a passenger train was thrown from the track by the spreading of the rails, 3 coaches being overturned and damaged. Two passengers injured.

9th, on Houston & Texas Central, near Waco, Tex., a mixed train broke through a trestle and was partially wrecked. One passenger injured.

12th, on New York, Lake Erie & Western, at Bloomfield, N. J., a passenger train jumped the track and crashed into some freight cars standing on an adjoining siding. The engine and smoking car were badly wrecked. Burning coals from the locomotive fire-box were scattered under the freight cars, igniting them. Three trainmen and 1 passenger injured. The derailment is said to have been caused by a loose or broken rail.

13th, on Northern Central, near Williamsport, Pa., a tem-

porary bridge gave way under a coal train, wrecking 16 cars.

15th, on Southwestern, at Smithville, Ga., engine and 2 cars of a passenger train derailed by a defective frog. Two trainmen injured.

16th, on Evansville & Terre Haute, near Mt. Vernon, Ind., passenger train derailed and ditched by a broken bridge, injuring the baggagemaster and 12 passengers.

16th, on Pennsylvania road, at Sarver, Pa., an excursion train was thrown from the track by the spreading of the rails. One car went over a 15-ft. embankment and was badly wrecked. Three passengers killed, 23 passengers and 2 trainmen injured. A jury found that the sleepers were rotten.

22d, on Philadelphia & Reading, near Shamokin, Pa., a freight train broke through a culvert, wrecking an engine and 20 cars. Several trainmen injured.

28th, on Cape Fear & Yadkin Valley, near Germantown, N. C., engine ditched by a broken trestle.

DEFECTS OF EQUIPMENT.

6th, on Pennsylvania, at Tacony, Pa., coal train derailed by the breaking of an axle, wrecking 5 cars and damaging several others.

7th, on Baltimore & Ohio, near Mount Vernon, O., freight train derailed and partially wrecked by the breaking of a journal.

7th, on Pittsburgh, Ft. Wayne & Chicago, near Lima, O., 6 cars of a freight train derailed and wrecked by the breaking of an axle under one of them.

7th, on Philadelphia & Reading, near West Spring Mill, Pa., several cars of freight train derailed and wrecked by a broken axle.

9th, on Pittsburgh & Western, near Edenburg, Pa., brake beam on tender of engine of passenger train broke, derailling 2 cars. Two passengers injured.

9th, on Philadelphia & Reading, near Wayne Junction, Pa., 7 cars in a freight train derailed by the breaking of a journal. All the cars were wrecked, 5 of them going over a high embankment.

11th, on Western New York & Pennsylvania, near Colgrove, Pa., the coupling between the tender and first car of a freight train broke and the engine dashed ahead to keep out of the way of the cars, but the engine was derailed at a curve. Engine and several cars damaged.

17th, on Burlington & Missouri River, near Lincoln, Neb., two rear cars of a passenger train were derailed and thrown over an embankment by a broken brake-beam. Six passengers, conductor and 11 employees injured.

18th, on West Jersey, near Atlantic City, N. J., rear truck of parlor car in a passenger train derailed by a broken flange.

19th, on Chicago & Northwestern, near Owatonna, Minn., a gravel train moving backward down grade on an spur track broke in two, the detached portion running off the end of the track, partially demolishing an adjacent dwelling and injuring one of the occupants.

20th, on Louisville & Nashville, at Hartsell's, Ala., 8 cars of a freight train derailed and damaged by the breaking of a truck. Brakeman injured.

21st, on New York, Pennsylvania & Ohio, at Cleveland, O., 7 cars of a freight train were derailed and badly damaged by a brake-beam dropping.

22d, on Pennsylvania, at Leechburg, Pa., 4 cars of a freight train derailed and wrecked by the breaking of a wheel.

22d, on Rome, Watertown & Ogdensburg, near Potsdam, N. Y., 8 cars of a circus train were derailed by the breaking of an axle, several of them being badly wrecked, killing or maiming a number of valuable animals.

25th, on Philadelphia & Reading, near New Columbia, Pa., 7 cars of a freight train derailed and wrecked by the breaking of an axle.

28th, on Chesapeake & Ohio, near Covington, Va., 8 cars of a freight train derailed by a broken truck, blocking the road 12 hours.

NEGLIGENCE IN OPERATING.

1st, on Kansas City, Ft. Scott & Memphis, near Merriam, Kan., 4 cars of a freight train were derailed by a steer which had got out of the rear door of a stock car and fallen upon the track.

14th, on New York, Lake Erie & Western, near Port Jervis, N. Y., an engine ran over a misplaced switch, and was derailed and thrown down an embankment.

14th, on Pennsylvania road, at Broad Street Station, Philadelphia, a passenger train being run into the station without an engine was allowed to approach the buffer stops too rapidly, and overran them, tearing the car off its trucks and wrecking the stationmaster's office.

21st, on Central of New Jersey, near Whitehaven, Pa., a heavy coal train descending a steep grade became unmanageable, and ran uncontrolled to a derailling switch near the foot of the grade, where it was thrown down a bank and wrecked. Two brakemen injured.

22d, a. m., on Knoxville, Cumberland Gap & Louisville, about 22 miles from Knoxville, the rear car of the first passenger train over this new road, containing many prominent citizens of Knoxville and others, was derailed at the trestle over Big Flat Creek and tipped off into the shallow stream below, about 30 ft., wrecking it completely. Five passengers killed and 24 passengers, an officer of the road and a flagman injured. Too high speed on poor track seems to have been the cause.

31st, on Beech Creek Railroad, at Newberry, Pa., passenger train derailed by a misplaced switch, the engine and baggage car being thrown over on their sides.

UNFORESEEN OBSTRUCTIONS.

2d, on Pennsylvania, near Wilmore, Pa., a large rock rolled down an embankment and struck a passing freight, and 10 cars were ditched and badly damaged.

6th, on Sioux City & Pacific, near Sioux City, Ia., a passenger train ran into a landslide, and the engine and 3 cars were derailed and went over an embankment.

9th, on Missouri Pacific, near Louisville, Neb., freight train derailed and wrecked at a washout.

9th, on Ithaca, Auburn & Western, near Genoa, N. Y., a passenger train ran over some horses and the engine was derailed and thrown on its side in the ditch. Engineer fatally injured.

11th, on Pittsburgh, Cincinnati & St. Louis, near Wellsburg, W. Va., a freight train ran over a cow and the engine and 10 cars were derailed and wrecked.

12th, on Southern Pacific, near Benson, Ariz., engine of passenger train derailed and ditched at a point where heavy rains had seriously impaired a 30-ft. embankment.

12th, on New York Central & Hudson River, at Shortsville, N. Y., passenger train derailed at a switch which had been tampered with.

13th, on Eastern of Minnesota, at Duluth, Minn., a switching engine was derailed and tipped off an embankment at a point where a sewer had undermined the sand filling.

13th, on Maine Central, near Brunswick, Me., engine and 2 forward cars of a passenger train derailed, the former going over an embankment. The derailment was caused by a nut which had been put on the track by a boy.

18th, on Southern Pacific, near Benson, Ariz., a west-

bound passenger train derailed at a point where a rail had been removed by train wreckers.

15th, on Wilmington, Columbia & Augusta, near Wedge-field, N. C., freight train derailed at a washout. Two trainmen injured.

15th, on Central of New Jersey, at Glen Gardner, N. J., freight train derailed by a misplaced switch, damaging several cars. Two tramps injured. It is thought that the switch had been purposely misplaced by tramps who had been put off the train.

17th, on Nashville, Chattanooga & St. Louis, at Nashville, Tenn., engine of switching freight train derailed by a piece of timber lying on the track.

18th, on Ohio & Mississippi, at Montgomery, Ind., a freight train ran over a cow, and the engine and 8 cars were derailed and wrecked. Two men in charge of stock killed.

19th, on Vicksburg, Shreveport & Pacific, at Delhi, La., a freight train ran over a mule and the engine and several cars were derailed and damaged. Engineer injured.

20th, on Colorado Midland, near Aspen, Col., a freight train was derailed at a point where an irrigating ditch had overflowed and undermined the roadbed, wrecking a portion of the train. One tramp killed and another injured.

21st, on St. Paul & Duluth, near Rush City, Minn., a freight train ran into a washout, ditching 12 cars.

23d, on Missouri, Kansas & Texas, near Moberly, Mo., a freight train ran over a cow and was derailed and wrecked. Engineer and fireman killed.

24th, on Eastern of Minnesota, near Duluth, Minn., freight train derailed and ditched at a washout. Several trainmen injured.

24th, on Burlington & Missouri River, near Pine Ridge Tunnel, Neb., a construction train moving backwards was derailed by a heavy plank which had been maliciously placed upon the track. Two trainmen and 9 laborers injured.

27th, on Birmingham Mineral, near Chepultepec, Ala., engine and 2 cars of a construction train were derailed by a piece of timber which had been maliciously placed upon the track. Engineer injured.

27th, on Northern Central, near Texas, Md., a freight train ran over a cow. Engine damaged and 7 cars wrecked.

UNEXPLAINED.

1st, on New York Central & Hudson River, at Amsterdam, N. Y., freight train derailed.

1st, on Mobile & Ohio, near Murphysboro, Ill., freight train derailed, 11 cars being badly wrecked.

2d, on Duluth, South Shore & Atlantic, at Duluth, Minn., passenger train derailed.

2d, on Union Pacific, near Schwanders, Col., passenger train derailed and ditched. Engineer killed and fireman injured.

8th, on Wabash, at Kansas City, Mo., passenger train derailed. One sleeper was thrown against and damaged some adjoining buildings.

9th, on Southern Pacific, at Oakland, Cal., a locomotive standing in the station ready to take a special passenger train was started backwards by the self-opening of the throttle so suddenly as to overthrow the fireman, who was in charge; the engine ran at great speed into and over the stop blocks, and damaged the building considerably. A number of the occupants of the ferry house had narrow escapes, and the throttle was finally closed by Superintendent Wilder while the engine was still plowing its way toward the end of the track at the ferry slip.

13th, on Gulf, Colorado & Santa Fe, near Plantersville, Tex., a freight train moving backwards was derailed. One trainman killed and another injured.

13th, on Chicago & Northwestern, near Goose Lake, Mich., car in a freight train derailed. Conductor injured.

13th, on Maine Central, near Iceboro, Me., car of freight train derailed.

14th, on Philadelphia & Reading, in the Black Rock Tunnel, several cars of a coal train derailed, blocking the track for some time.

15th, on Georgia Pacific, near Bankston, Miss., car of freight train derailed.

16th, on Gulf, Colorado & Santa Fe, near Plantersville, Tex., engine of construction derailed and overturned in the ditch. Engineer killed, fireman injured.

16th, on Missouri, Kansas & Texas, near McAllister, I. T., freight train derailed, wrecking 8 cars. Tramp killed.

16th, on Nashville, Chattanooga & St. Louis, at Estell Springs, Tenn., 3 cars of a freight train derailed.

16th, on Annapolis, Washington & Baltimore, near Bay Ridge, Md., passenger train derailed.

16th, on Boston & Maine, at East Cambridge, Mass., passenger train derailed, damaging the engine.

17th, on Houston & Texas Central, near Waco, Tex., accommodation train derailed and partially wrecked. Brakeman injured.

20th, on Chicago, Santa Fe & California, at Hurdland, Ia., freight train derailed, wrecking 10 cars.

20th, on St. Louis, Arkansas and Texas, near Randolph, Tex., 2 cars of a freight train derailed and damaged.

21st, on Delaware, Lackawanna & Western, near Waverly, N. Y., freight train derailed.

22d, on Lake Shore & Michigan Southern, at Erie, Pa., freight train derailed. A tank car containing oil immediately exploded, and a portion of the train was destroyed. Two employees were badly burned.

26th, on Chicago, Santa Fe & California, at Kinsman, Ill., a fast passenger train was thrown from the track and 3 coaches, 2 sleeping cars and a dining car went over a high embankment, wrecking them badly. Four passengers injured.

27th, on Illinois Central, at Waterloo, Ia., 2 cars of a freight train derailed and wrecked, killing a number of cattle. Three trainmen injured.

28th, on East Tennessee, Virginia & Georgia, near Newcomb, Tenn., a derailed car of a freight train struck the end post of an iron bridge, and the structure, together with 8 cars, 3 going into the creek and 5 down the bank.

28th, on Chesapeake & Ohio, at Hawks Nest, Va., 2 cars in a freight train derailed.

29th, on Union Pacific, near Estabrook, Col., passenger train derailed, several cars going into the ditch. One passenger killed and a number of others injured.

30th, on Blue Ridge & Atlantic, near Rabun Gap, Ga., passenger car of a mixed train derailed, injuring conductor and 3 passengers.

OTHER ACCIDENTS.

1st, on Philadelphia, Wilmington & Baltimore, near Stockton, Md., a special officers' train struck a hand car, badly damaging the engine.

2d, on Atchison, Topeka & Santa Fe, near Wallace, N. M., engine of a construction train exploded its boiler. Fireman badly scalded.

6th, on Pennsylvania, near Newton, N. J., engine of a freight train struck a draw-bar which had been dropped upon the track by a preceding freight, damaging the freight.

6th, on Mobile & Birmingham, near Walker Springs, Ala., an empty engine broke a driving-rod, demolishing the cab. Engineer and fireman killed.

11th, on New York & Brooklyn Bridge road, at the New York end, axle under car of passenger train broke.

20th, on Philadelphia & Reading, near Quakertown, Pa.,

engine of passenger train broke an eccentric strap, and the loose end of the eccentric struck and broke off a blow-off cock. Engineer and firemen slightly scalded by escaping steam.

A summary will be found in another column.

The New Erie Journal Box with Morris Pressed Steel Lid.

The pressed steel journal box cover is one of the most widely appreciated improvements in details of freight car truck construction that has been brought out for some time past, and, therefore, the illustration of the new design of journal box for the Erie, made with the especial purpose of using the Morris pressed steel journal box lid, without machine work upon the boxes, will be found interesting.

Fig. 1 shows the side elevation of the box with the journal, brass and wedge in position. The journal is 4 in. in diameter and 8 in. long. This figure also shows the lid closed into running position. Fig. 2 illustrates the half section through the journal, brass and wedge and half of the end view, showing the hole and slot for attaching the pressed steel lid. Fig. 3 is a plan of the box, and from it can be obtained the general appearance of the lid when it is in a running position. Fig. 4 shows the lid separated from all other parts, and with the spring lip in its normal position. Fig. 5 is the bolt which passes through the end of the cover and forms its hinge, and fig. 6 the jointed hook with which the lid can be easily removed entirely from the box. Figs. 7 and 8 show the brass and wedge used with this box.

The face of the box against which the lid bears is cast against a chill, in order that the surface may be smooth and not require machine finishing. When the cover hinge bolt is inserted the curved lip of the lid is pressed downward until the bolt passes through the ear on the journal box, the projection on the end of the hinge bolt passing down through the slot shown in the ear of the box. When the bolt is forced to this position it is rotated by a wrench applied to the hexagonal head; this causes the projection on the bolt to ride up the inclined flange, formed by a projection on the back of the ear of the box, until it passes over and falls into the recess on the back of the ear, where it is firmly held in position until it is necessary to remove the cover from the box to replace it, and then the curved lip on the cover is compressed and the reversal of the foregoing motions releases the cover from the box. This is an exceedingly simple way of fastening the cover, and in a satisfactory manner removes the objectionable nut so often seen.

In order to facilitate the removal of the lid in case of repairs the jointed hook lever shown in fig. 6 has been devised. In use the end of the jointed hook is caught under the back of the ear on the box and the V-shaped projection on the handle of the lever is placed in the centre of the bolt head. By pressing on the lever handle the spring lip of the cover is compressed, and the bolt easily turned with a wrench until the projection thereon coincides with the slot in the ear, at which point the bolt and cover are easily removed. This design of hinge, bolt and lever enables the use of a rough bolt, and requires but little labor at the hands of the car inspector. The time required to remove the lid and replace it is about 5 seconds. The pressure of the spring lip on the bolt when in its normal running position is about 100 lbs.; this prevents all chattering.

The cost of the bolt is about 3½ cents each, and it weighs about 14 ounces. In the absence of the special bolt an ordinary one can be used, and also, owing to the large diameter of the special bolt and the location of the slot, box lids that will fit the M. C. B. standard boxes can readily be used on the box illustrated.

This box will accommodate the proposed $4\frac{1}{4} \times 8$ in. M. C. B. standard journal, and is now the standard 4×8 in. journal box on the Erie.

Car Service Associations.

The committee of the General Time Convention on Car Mileage and Per Diem Rates has issued to the members of the convention a report embodying a scheme for local car service associations, which it considers practicable for adoption generally throughout the country. The committee consists of Messrs. Theodore Voorhees, P. P. Wright, S. M. Prevost, F. K. Huger, C. H. Platt, George B. Harris and H. F. Royce.

The committee says: "Any suggestions looking to the improvement of the methods proposed will be gladly received by the committee, and should be forwarded prior to Oct. 1, addressed to the secretary of the convention. Your committee has not attempted to cover all the points which local circumstances may require to be met, but only to propose a general agreement, instructions, blanks, etc., which it believes should be the basis at all places where such associations may be established."

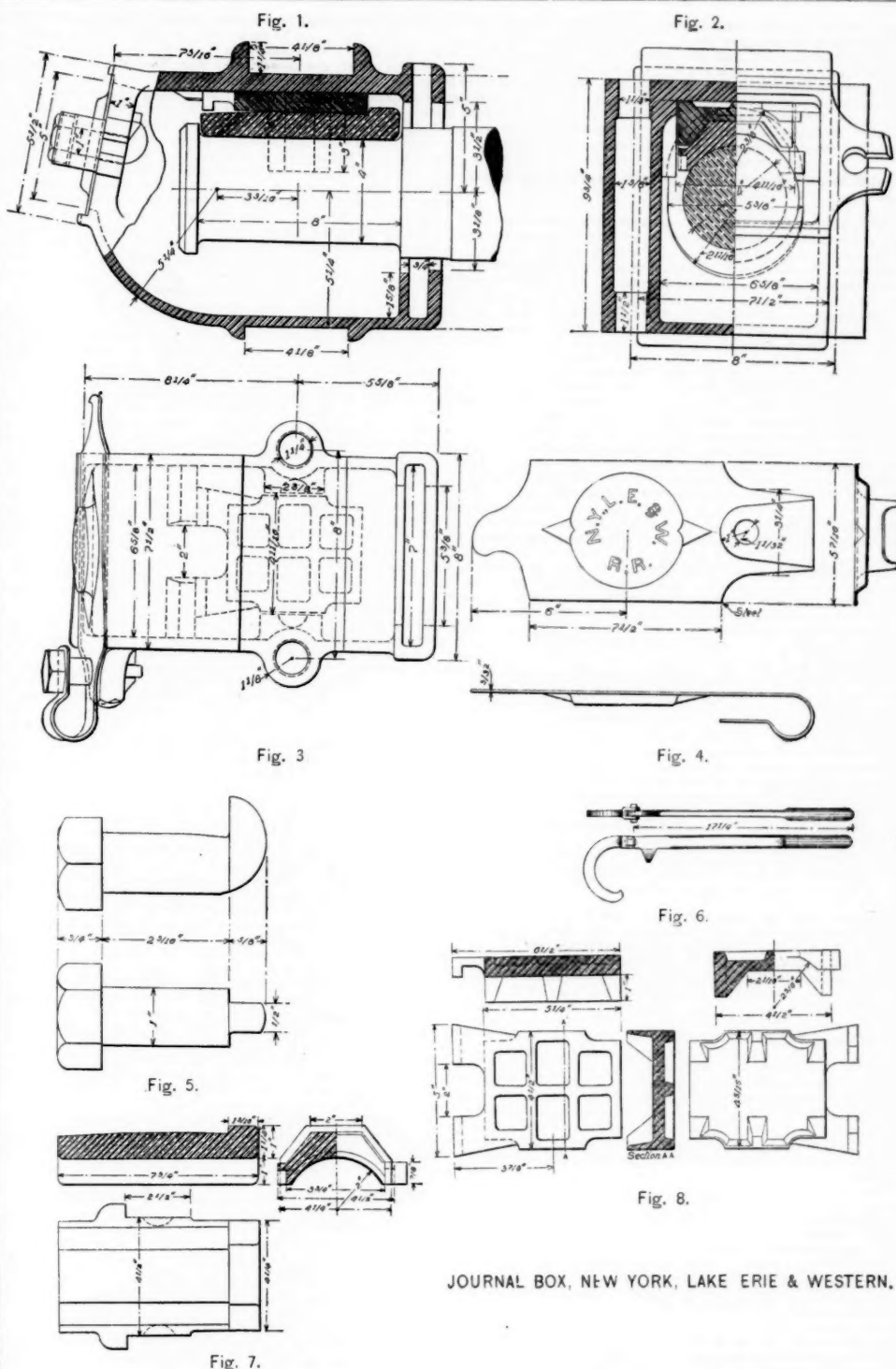
and association may be established. The association's position has been decidedly advantageous to the railroad companies members thereof, and has given general satisfaction to their patrons in the quicker handling of their freight which has been accomplished. At Chicago, where the average detention of cars on different roads varied from six to fifteen days before the association was formed, and on the same roads the detention now averages less than one day, while a similar result has been experienced also at other points.

"Your attention is directed to the advisability of giving the public thirty days' notice before the rules of such association take effect, and a form of such notice, recommended by the committee, is inclosed herewith.

"On the subject of weighing associations, your committee is not prepared to fully report, but can see no reasons why such associations cannot be advantageously combined with the car service associations, except at points where the amount of business is so great as to make a separate organization desirable."

A form of articles of agreement is submitted providing for the administrative organization. The following are some extracts from the Articles of Agreement:

The manager is empowered to call upon the train dis-



JOURNAL BOX, NEW YORK, LAKE ERIE & WESTERN.

patcher, local freight agent, yardmaster or such other employees as may be designated by the road interested, and who may be located within the boundaries of this association, for such information, statistical or otherwise, as may be required from day to day, and orders shall be given to such delegated employees to furnish representatives of this association such information promptly.

It is agreed that a minimum charge of \$1 per car per day shall be made for detention to all cars and use of tracks at all points within the territory covered by this association hereinafter defined, after forty-eight hours from the time of delivery of cars on track for loading or unloading, not including Sundays nor legal holidays, it being understood that collections be made by and shall belong to each company for detentions on all side tracks directly connected with its line. Provided, that if any road a party to this agreement shall decide to charge more than the sum named, it may notify the manager, who shall enforce such charge on cars on tracks of such roads as said road may direct. A fraction of any day after forty-eight hours shall be considered a day. All roads shall be permitted to store a day's supply of for any consignee beyond the forty-eight hours allowed for unloading.

[NOTE.—This clause has been introduced to provide for special classes of shipments on which longer time may be necessary, owing to peculiar circumstances or conditions.]

Each railroad company shall place upon its delivery track all cars containing freight to be delivered in that manner immediately upon arrival, or as soon as after the ordinary routine of yard work as is practicable. No cars shall be held in any manner, provided it is possible to secure their delivery, and the manager is charged with the duty of seeing that the purposes for which this association is formed are not evaded by any railroad company.

Delivery of cars shall be considered to have been effected at the time when such cars have been placed on recognized or designated delivery tracks, or (if such track or tracks be occupied by cars belonging to the same consignee and detained over forty-eight hours) when the road offering the cars would have delivered them had the condition of such track permitted.

No railroad company shall hold any freight in cars for outside the territory embraced in this agreement, unless such action be done in good faith and to avoid a blockade in In case it is necessary to hold

out any freight from for the purpose stated, the manager of this association shall be at once notified of such action by the railroad company, and he shall make investigation immediately with the intent of determining whether such action is proper, and is not a violation of the intent of this agreement. Any road holding cars outside the limits embraced in the association agreement for the purpose of avoiding the delay and charges for detention to cars shall be considered as having violated the terms of the agreement, and sh^{al} be liable to the penalty therefor.

When cars are ordered to connecting lines, charges for detention of cars should in all cases be collected by forwarding agent. If it is not practicable for the forwarding agent to collect, such charges will follow as advances. If freight is transferred, charges for detention continue on car to which transfer is made.

When both cars and tracks are owned by the same private parties, no charges will be made; but when private cars are detained on the track of other corporations, firms or individuals, or on track belonging to or operated by members of this association, or cars belonging to the latter on private tracks, the regular detention charge shall apply.

Cars detained for want of billing instructions, by reason of improper or imperfect billing, or by reason of being billed to order, or awaiting instructions as to disposition by the consignee, shall be subject to these rules and regulations.

All bills of lading, receipts for freight, expense or freight bills and notices shall have stamped or printed thereon such proper notation as this association shall require, which shall advise consignees of the charge to be made for detention in loading and unloading cars.

Instructions to local agents are formulated, showing when charges are to begin under various circumstances and when cars are or are not subject to charges.

In case consignors or consignees refuse to pay charges on cars, the line interested shall refuse to switch any cars for such consignors or consignees until such charges are paid. Agents will report to the manager the name of any corporation, firm or individual refusing to pay the charges herein provided.

All bills of lading, receipts for freight expense or freight bills and notices to consignees shall have printed or stamped thereon as follows: "If this car is not unloaded within forty-eight (48) hours, a charge will be made for detention and use of tracks of \$1 per day."

A set of 11 blank forms for reports is submitted. These

include (1) reports of loaded cars received; (2) reports of cars for which orders have been received; (3) statement of cars placed for loading and unloading; (4) statement of cars released and returned or served. These are daily reports from agents to the manager. Form 5 is a report of collections made for car service, to be made four times a month, from agents to the manager. The other forms provide for checking reports of collections and incomplete records, for claims for refunds of car service charges, etc.

Reception and Dinner of the New England Railroad Club.

The first regular meeting of the New England Railroad Club after the summer vacation was held on the evening of the 11th inst. at the United States Hotel, on which occasion the members of the club and invited guests, including a large number of ladies, held a reception from 6 to 7 o'clock, after which an elaborate dinner was served and highly enjoyed by those present. After the feast had been fully discussed and the tables cleared, President Richards called the assembly to order and announced that hereafter the meetings of the club would be held at the United States Hotel. He then addressed the company in substance as follows:

"I will take this opportunity to say a few words to the guests of the club as to its nature and object, which is to promote a knowledge of the things relating to the construction, equipment and operation of railroads and social intercourse among the members. Now, the importance of this intercourse among the members cannot be overrated. All through life we see the necessity of it; we see men of every business, trade and profession meeting together for the interchange of knowledge. It is only by such interchange of knowledge and through books that a man can be posted as to what is going on in the world, and what has been done in the past.

"It is a common saying that almost every man has a hobby, or, as it is expressed by the word in the dictionary, a hobby-horse. George Stevenson had a hobby; he rode it to success. George Westinghouse has a hobby; the result of that hobby is seen on all the roads to-day. It is said the old Egyptians had a hobby, which was to build monuments that would endure; and the story of the nation would be lost in the mists of the past but for these monuments of stone which still exist. In later days we find hobbies in great variety amongst railroad men; hobby after hobby is brought to our attention. Sometimes they become a nuisance; sometimes they are otherwise. One day we see a man with a new locomotive, which is to supersede all those now in use; the next day a man with a patent oil box, which saves all the oil, besides manufacturing a good deal more; then another with a patent automatic coupler, followed by a man with a shotgun; then a man with a patent switch, which is sure to be safe; or a man with a wheel that never breaks, or some other smooth-tongued fellow who is ready to pour oil on the troubled waters of life. Now, the business of the club is to take all these hobbies, to investigate them, select the good and reject the bad, proving all things, and holding fast to that which is good.

"I will now introduce to you Mr. James N. Lauder, of the Old Colony Railroad, ex-President of the New England Railroad Club, who will be pleased to entertain you."

Mr. Lauder said in part: "I want to say a word in the same direction in which our president started; that is, with reference to the influence which these clubs have, and especially this one, on the railroad profession. This club was started some six or eight years ago, and its members have worked hard to make it a success. It has been a decided success, and if the truth were known, which it never can be, of course, the railroads of New England especially, and perhaps of the whole country, have profited by the discussions that have taken place in the New England Railroad Club. Different subjects have been taken up and discussed very thoroughly, perhaps wisely and sometimes perhaps unwisely; but, as our worthy president suggested, the failures men have made are worth more to the world than their successes.

"There is another thing which I think might tend to increase the good we do; that is to try to induce other departments of railroading to join us to a greater degree than they do now. This is a Railroad Club; it is not a Master Mechanics' Club, or a Master Car Builders' Club, or an Engineers' Club, but it is a Railroad Club. It is looked upon by the outside public as particularly devoted to the discussions of subjects connected with the rolling stock of railroads. Now, it is just as applicable to our principles and our standing as a club to discuss the track, the best methods of laying the track, how to put up signal poles, and what we shall have as a code of signals, and various other things, as to discuss the question of rolling stock. But we never have seemed to be very successful in getting into the club those interested in the other departments. I would be glad to see a strong representation in this club of the trackmen, roadmasters and engineers. I should be especially glad to see that class of railroad mechanics identified with us, because the relation between the matters which they control and the matters which are controlled by those who have charge of the rolling stock is so intimate that it is very appropriate that the men in control of the two departments should meet and discuss these questions together.

"It has been suggested that, in order to prevent confusion in selecting subjects for discussion at the various clubs throughout the country, and especially with regard to this one and the one in New York, there ought to be some understanding, so that the two clubs should not take up the same subject at their meetings. I have also heard it suggested that it might be beneficial to both clubs to meet on alternate months, first to have a meeting in Boston, and the next month a meeting in New York. I simply mention this so that the members can be thinking about it between now and the next meeting. It is a matter that I think will bear investigation.

"I am going to wind up my talk by making a motion. I move, Mr. President, that the subject for discussion at our next meeting be 'The Permanent Way and Rolling Stock, and their Relation to Each Other,' and that the secretary be instructed to invite, through the proper officers, the New England Roadmasters' Club to join us at that meeting and discuss this question with us."

The motion was carried.

The following is an abstract of the speech of Mr. E. M. Lewis, of the *Railway Master Mechanic*: "Railroad men deal with such terrific speeds, with such weights, with such nice pressures and such distances, that of all men in the world they have to watch the keenest and be the most careful in all things. I claim that the discipline of railroad work has developed in this country a class of men more truly educated, in the true sense of the word—that is, a man is educated when what is possible in him is led out—than men have been in any past age of the world.

"There is hardly a single department of railroading that would not interest man, woman and child. Now take that matter of charging freights. It is not many years since farming in New England was a profitable occupation, and in the generation before this, or the generation before that, the farmers were the leading men. Now, farms are abandoned and the people are going West who have been farmers. Why? Not merely because of the railroads; but it is because

in order to encourage places west, and still further west, and still further west, and to make sales of lands to the millions who have been poured into this country, freights have been put down lower and lower, and the New England farmer finds his business gone. That one matter of fixing the rates of transportation has changed the civilization of New England. This is a subject not to be treated hastily; it is an important thing to consider, perhaps to legislate about, and, indeed, legislation has already begun, and if we could be sure that our legislators would be wise and make the best possible laws for the good of the people, and not for their own good to-day and the next election, it would be safe, perhaps, to have legislation on this subject; as it is, it is dangerous."

James W. Marden, of the Fitchburg Railroad, and ex-President of the club, spoke next. "I will only say to the members of the Railroad Club that this has been in my opinion a good starting off for us, and we have before us this winter, or ought to have, some very hard work to do in our railroad clubs, and especially in the New England club. It may be said, perhaps, that railroad topics have been worn threadbare, but I assure you that every day there are things coming up in my work, in every-day matters, that have been discussed time and time again, in which I should like to have the opinion of my co-laborers. I think we can still discuss with great benefit the subjects of journal boxes, journal bearings, the old threadbare topic of draw-bars; we have only just commenced on it, I don't know when we shall ever come to the end of it; perhaps never. There are a great many things connected with our railroads that we ought to discuss in our meetings that are very important and interesting, and I hope the suggestion of Mr. Lauder that we have our meetings on alternate months, a meeting in Boston one month, and the next meeting in New York the next month, will not prevail. The New England club has existed for the last six or seven years, meeting once a month, and I think we have made our meetings fairly interesting, and I hope we shall be able to get together so often during the coming winter, and make our meetings so attractive that each succeeding meeting shall be an improvement on the last, and that the enthusiasm of the members will increase."

Ex-President F. D. Adams spoke as follows: "I came to this entertainment with the understanding that a committee was appointed to make provision for speakers here to-night, and I think they have either failed to do their duty, or have sprung a trap upon the ex-presidents of the Northeastern Railroad Club. Mr. Lewis speaks about giving the railroad men taffy. He knows how to do that; but let any one differ from him in regard to the draw bar question, and see if he gives them taffy; he gives them something else every time. I suppose we shall have to discuss this question again this winter, and if we run counter to Mr. Lewis' views he will give us Hail Columbia in his paper. Some of the newspapers go for the railroad men quite recklessly once in a while. I read a little article in a Boston paper a few days since to the effect that any railroad that would not, in this age of the world, adopt an automatic coupler, and a train brake should have its charter annulled at once. That looks a little tough. If the writer would look at the matter seriously for a moment, and inquire into the cost, he would find that there are about a million cars in this country, and to equip them with train brakes would cost \$50 each, or \$50-000,000. Mr. Lauder says it would cost \$100 each. The cost of the brake is \$50, and there is the expense of putting it on. Where is this money to come from? The newspapers don't stop to consider the time, and labor, and money required for such a thing. So with the automatic coupler; they think it is easy enough to get an automatic coupler to work beautifully, but you can't find a trainman to-day who will vote for the automatic coupler."

Mr. LAUDER: I should like to ask brother Adams what difference it makes whether the trainmen like the automatic coupler, or not, so long as the fellows up at the State House decide for it?

Mr. ADAMS: That idea had not occurred to me. At this point the company adjourned to the hotel parlors, where the festivities were continued in an informal manner.

The Denver Convention of the Roadmasters.

The Roadmasters' Association of America met at Denver Sept. 11. Notwithstanding the distance from the centre of population, the attendance was good. The convention was welcomed to Denver in an address by Mayor Londoner, to which President Craig replied.

The first paper read was on Standard Track Joints, by Mr. I. Burnett, First Vice-President of the Association. Mr. Burnett took the ground that no joint could be devised that would absolutely prevent the ends of the rails becoming depressed. His reasoning was that under the influence of changes of temperature, the head of the rail, being more exposed than the foot to the direct rays of the sun, would expand more rapidly, and to a greater degree, thereby causing an upward camber through the length of the rail. In winter, also, he suggests, the foot of the rail, being more exposed to the frost, would contract more rapidly than the head, causing the same result. He suggests, therefore, that in finishing the rail it should be left from $\frac{1}{4}$ to $\frac{3}{4}$ in. lower in the middle.

Mr. Burnett does not favor the long angle splice, but would prefer angle plates not to exceed 24 in. in length, made of steel, reinforced by a channel plate to support the bottom of the rail—all used as a suspended joint. He mentioned a joint which he had seen on the Chicago & Northwestern, made somewhat on this principle. It consisted of angle splices 13 in. long, with a surface plate below, suspended. This joint was put in service in 1875. It has been subjected to a heavy traffic, 16 passenger trains a day going over it. He saw very few battered rails or low joints, no broken angle bars or bent plates. The Chief Engineer of the road had informed him that a plate in connection with 12 in. and 24 in. angle bars had been used for many years and given them great satisfaction. This year they have put in a joint like that which Mr. Burnett suggests, viz., 24 in. angle bars with a channel plate below the rail, and Mr. Burnett says they have abandoned the long angle bar.

He showed photographs and blue prints illustrating some tests of joints which he had made. These tests were as follows:

Test No. 1.—Steel angle bar 23 in. long; weight, 40 lbs. per pair; Chicago, Rock Island & Pacific standard for 70-lb. rail was placed upon 12-in. supports, and a load of 80,000 lbs. applied, showing no deflection; load then increased to 70,000 lbs., with no perceptible deflection. I then increased the load to 100,000 lbs., showing a deflection of $\frac{1}{4}$ of an inch; upon releasing the load it recovered instantly.

Test No. 2.—Steel angle-bar, 44 in. long, 76 lbs. per pair.

J. T. Clark's patent taper bar; Michigan Central standard for 80-lb. rails, made from drawings furnished the manufacturer by the Chief Engineer; this bar had to be slotted at the centre (or nearly so). This joint was placed on 16-in. supports, and when a load of 62,000 lbs. was applied the bar broke from the centre slot; at the point of breaking there was no perceptible deflection.

Test No. 3.—Joint same as No. 2, 16-in. supports; when a load of 70,000 lbs. was applied both bars broke from centre slotting, and from the bottom up.

Test No. 4.—Joint same as Nos. 2 and 3, except the bars were not slotted in the centre; joints placed upon 16-in. supports, and a load of 100,000 lbs. applied, showed a deflection of 0.09 of an inch; then the load was increased to 102,000 lbs., when they took a permanent set of $\frac{1}{4}$ of an inch, measurements taken from supports, and at this deflection the bars showed no trace of fracture, and the bottom of the rails separated $\frac{1}{2}$ of an inch. This test gave heavy tensile strain.

Test No. 5.—Michigan Central joint same as Nos. 2 and 3, with this exception, viz.: the bars were placed away from the outer edge of the flange to $\frac{1}{4}$ in. back of the slotting; these bars were placed upon 16-in. supports, and loaded to 90,000 lbs.; deflection very light; then the load was increased to 135,000 lbs.; at this point one of the bars broke at its weakest point, viz.: the bolt hole; deflection at centre of supports $\frac{1}{4}$ of an inch; bottom of rails at the joint separated 1 1/16 in.

Test No. 6 was a test made of Michigan Central bars, same as Nos. 2 and 3, by placing them under a hammer, with supports about 8 in. apart, and laying a piece of round iron on top of the bar, directly over the slotting; the bar broke from one blow of the hammer, about 700 lbs.; then the bars were moved and supported between the first and second bolt holes, and struck six blows at one end and five blows at the opposite end; no fracture can be found at either point.

As a result of these tests I say that when you slot a steel angle bar you take away 40 per cent. of its value.

Mr. Burnett's paper was followed by a communication from Mr. F. A. Delano, Rail Inspector, Chicago, Burlington & Quincy. This communication was addressed to Mr. Burnett and was written at his request. Mr. Delano formulated as the principal requirements of the joints the following:

First—The splice bar must hold the two ends of the rail at the same level; not allowing the slightest depression in one end without an equal depression in the other.

Second—The strength to resist a vertical stress or shock downward at the joint should be fully 25 per cent. greater than the strength of the rail to resist a similar stress or shock at any point in its length.

Third—When the joint contrivance is tightened securely in all its parts, in a condition to meet the above requirements, the expansion and contraction of the rails should be absolutely unhindered; otherwise, the rails will be bent while expanding, and the track, in extreme cases, be buckled or spread.

Fourth—At the same time the rails must be held so firmly that, with good ties and ballast, the creeping or running of the track will be effectually prevented.

Fifth—The joint device should not require a form of rail which is uneconomical in the disposition of metal, or which for any reason is not as well suited as another form.

Sixth—The ease of manipulation, as governing the convenience and rapidity of laying track. Thus if a joint is cumbersome, in many parts, and slow to lay track with, such disadvantages should be taken into account in figuring the first cost of the joints.

The fish plate and angle-bar type meet the first requirement very well while they are new and the bolts are tight, but when loose, worn or bent this type of joint loses its value.

This joint he considers deficient in strength. With the width of rail head which is now being widely adopted it will be possible to make a stronger angle splice, but still its strength will only be effective when the bolts are tight.

He considers the angle splice type of joint defective in the third particular, as it must necessarily hold the rail tightly.

As to the fifth requirement this type of joint is defective in that it requires flat fishing angles and small internal and corner fillets in order to give the largest possible area of contact between the angle splice and rail head.

In adaptability to rapid tracklaying this type of joint is the best of anything yet devised.

Altogether, Mr. Delano does not think that the perfect joint has yet been invented, but he is not certain that anything has been devised better than the angle bar. For light roads, like the greater part of the lines in prairie country, he is inclined to think that a 4-bolt angle joint extending over three ties will always be used, but he recommends a comparatively short splice, say 32 in. long, and spacing the ties closely. For main line use with heavy traffic he thinks that the angle-bar joint will have to give way to some other type or to be re-enforced. He is inclined to think that a joint like that which Mr. Burnett recommends may be the solution for this class of track. With a composite joint of this type the rails could be laid with the angle bars bolted on and the base plates put in later, thereby interfering the least possible with convenience in renewing rails. The shortness of the angle bar will prevent excessive interference with expansion and contraction of the rails.

"It should not be forgotten that one reason that angle bars have not given better service, is, that everything in connection with the joints has been mechanically crude, with no attempt to precise accuracy. The holes in the rail are drilled with the greatest disregard for small fractions and when three holes are drilled in each end, the main object of the rail mill and the inspector usually is to have the holes big enough, the experience being that if the holes are big enough, so that the bolts all go in easily, no fuss will ever be made. The button head bolt is also a very unmechanical arrangement because both the inside and outside angle bars are punched to allow for ovalness in the shank, which only occurs on the 'head' end. It seems to me that the bolt holes in the rail should be drilled with twist drills and through steel bushed templates, and then, with carefully punched or drilled angle bars and square head bolts, this style of joint would stand upon its merits. At the present time, although the importance of accuracy seems so obvious, it is one of the hardest things in the world to obtain.

"Last but not least, good joints depend a great deal both on the man who lays the steel and the man who takes care of it. Rails which are laid one quarter of an inch apart in midsummer, when they should be close together, cannot give the best results, no matter how good the subsequent maintenance may be. However, irrespective of the care which joints may get, they have a tendency to get low. Firstly,

because there is a blow at the opening between the rails to cause this, and secondly, because the rolling of the wheels tends to lengthen the head, while the base remains the same, thus arching the rail to the detriment of the joint. The first difficulty cannot be wholly avoided, but possibly the second might be partly overcome by making the rails a little low in the centre. I do not mean by this that the rail should show this hollow when in the track, but simply that when on supports 15 ft. apart, and $7\frac{1}{2}$ ft. from each end, the rail should be hollowed enough to be $\frac{1}{4}$ to $\frac{1}{2}$ inch lower at the centre than at the ends. As I have already said a good deal more than I intended, I will cut off here rather abruptly, it is true, but perhaps none too soon."

The following officers were elected for the coming year: President, John Sloane, Indiana, Bloomington & Western; First Vice-President, W. H. Courtney, Lake Shore & Michigan Southern; Second Vice-President, John Doyle, Detroit, Lansing & Northern; Secretary and Treasurer, John C. Ramsey, Cincinnati, Hamilton & Dayton, Connorsville, Ind.; Member of the Executive Committee, George E. Cain, Toledo, Kansas City & St. Louis. The next convention is to be held at Detroit.

The Jull Snow Excavator on the Rome, Watertown & Ogdensburg.

The letter which appears below explains itself. We do not publish it as containing information new to our readers. The essential facts recited in Mr. Haselton's letter were published in our issue of March 29. Before publishing them we had them confirmed by officers of the Rome, Watertown & Ogdensburg, and by others who were at the trials. Therefore this letter was not needed to convince us that the article to which it replies was an uncalled-for and really unfounded attack.

The letter is accompanied by affidavits which give little additional information, but go to confirm Mr. Haselton's statements.

OSWEGO, N. Y., Sept. 12, 1889.

Mr. Charles H. Otis, Treasurer Jull Mfg. Co., etc.
DEAR SIR: Referring to your favor of Sept. 6, 1889, calling my attention to an article in the issue of the *Railway Age* of Aug. 23, 1889, pertaining to the trial tests of the centrifugal snow excavator of your company, in March of this year; having been an eye witness of the three trial tests, I deem it but justice to your company to say that the statements contained in the *Railway Age* article are, almost without exception, false and misleading; while the statements made in the articles published in the *Railway Age* of March 15 and March 29, 1889, were substantially true, as an inquiry from any of the gentlemen mentioned in the articles would have proven.

The facts are as follows: Three trial tests were made of your excavator upon sidings of our road in the immediate vicinity of Oswego, on March 6, March 9 and March 11, 1889, respectively. The latter was a public exhibition, and was witnessed by W. F. Pascoe, Superintendent of Bridges of L. V. R. R.; R. Caffery, Roadmaster, and E. F. Swartz, of the same road; H. D. Titus, Superintendent of the Southern Central Road; H. C. McCarthy, Bridge Builder, Pennsylvania Railroad; by representatives of the Oswego *Advertiser* and the Oswego *Daily Times*, and by General Manager E. S. Bowen, myself and several other officials of the R. W. & O. Railroad. I also personally witnessed the two previous tests.

On the occasion of the test of March 6, 1889, your excavator cleared a siding upward of 700 ft. in length, which was covered with hard snow, packed and frozen. The depth of the snow varied from 2 to 7 ft. Your excavator cleared this siding without difficulty, and without a single stoppage from beginning to end. The time consumed was not taken.

On the occasion of the test of March 9, 1889, referred to in the *Railway Age* article of Aug. 23, your excavator was put to work on another siding, about 900 ft. in length, which was filled with hard snow, from a depth varying from 2 ft. to about 9 ft., the depth of the snow being, for the greater part of the distance, not less than 7 ft. A single locomotive was used to push the excavator into the snow. Before the snow was reached, the centrifugal cutter was set in motion by the engineer in charge. Just before your excavator reached the snow bank the engineer in charge discovered that his boiler was making water too fast, and consequently shut off steam, but neglected to signal the pushing locomotive to stop also. Your excavator was jammed into the snow by the pushing locomotive while its knife was not revolving, and, as a necessary consequence, the hood of the excavator was blocked with snow. The excavator was drawn out, the snow removed, a second locomotive attached, and the "Rotary" cutter again set in motion, and your excavator cleared the siding of 900 ft. in length, without a single stoppage, in an almost incredibly short space of time.

On the occasion of the trial test of March 11, 1889, two engines, one a 16x22 and the other a 17x24, were put behind your excavator to hold it to its work. When it reached the bank a column of snow shot out from one side, and was thrown from 40 to 60 ft. away. By actual measurement, as given by the railroad officials mentioned, sent by their respective roads to witness this trial, your excavator cleared 722 ft. of track, having an average depth of 7 ft. of snow, in seven minutes' time. It is not true that the snow removed on this occasion averaged but a few inches in depth, but in places and for a distance of several feet, at least 50, I should say, the drifts of snow were not less than 12 ft. in depth; nor that the most of the track was actually exposed; nor that the snow was thrown out of the front of the machine; nor that this performance, instead of showing the "Jull machine to have worked even better than the other," (the Rotary), it clearly demonstrated its inferiority, and its absolute inability to properly do the work in hand; but on the contrary, the performance of your excavator demonstrated its very great efficiency to do the work required of it. Nor was "the Jull plow put at work on a side track, to determine its ability to open the main line;" nor was the snow that was "disposed of by the plow thrown out of the front of it, blowing back among its machinery;" nor did our officials have "recourse to the Rotary," because your excavator was unable to do the work; nor had our Rotary "been housed in order" at the Jull being tested; nor did the Rotary clear "the road of its snow embargo without trouble or mishap, fighting its way through drifts from 12 to 18 ft. deep."

The "Rotary" in our possession is owned by our road, and was put to work by us, in the ordinary way, to do the work of our road, which was required to be done, without any reference whatever to your excavator. Your excavator had been sent to Oswego to be submitted to the severest possible tests, and we selected the most difficult tasks which we could find for it to execute, and it performed its work excellently. I send you this statement as an act of simple justice to what I regard as a meritorious enterprise, and in fulfillment of the American idea of "fair play," I am,

Yours very truly, G. H. HASELTON,
Supt. Motive Power and Machinery, R. W. & O. R. R.

The following extract from an affidavit, made Sept. 14 by the fireman on the excavator at the time of the trials, explains the matter of stopping in the drift and snow jamming the machinery:

"I was the fireman of said excavator, and was personally present upon the excavator upon the occasion of the trial tests made at Oswego, New York, on March 6, March 9 and March 11, 1889. On the occasion of the trial test of March 9, 1889, as we started for the drift, which was about 50 feet distant, the machinery of the excavator was put in motion slowly, and I understood the locomotive pushing the excavator would stop when reaching the drift, but before entering, so we could work the water out of cylinders and brighten up the fire under boiler. This was not done, but instead we rushed into the drift without notice, and the machinery was stopped by the engineer immediately, because of the misunderstanding. Snow was, as a matter of course, jammed into the hood, the cone and blades of the excavator. Another locomotive was brought and the excavator drawn out of the snow, the snow was removed from the hood and blades and a second start made with the knife in motion. After the second start had been made the machine worked steadily and cleared all the snow from the tracks of the siding upon which it was being operated, without any stoppage or delay of any kind whatsoever."

TECHNICAL.

Timber Preservation by Wood Creosote.

The Carolina Oil & Creosote Co., of Wilmington, N. C., is, as is known, the proprietor of the carbonizing and wood-creosoting process for preserving timber. The company uses in its preservative treatment of timber, wood-creosote oil, which is manufactured at its own works from the heavily resined fat pine abundant in the Carolinas. This timber yields a product rich in creosote and other heavy oils and constituents valuable in the preservative treatment of timber. An analysis of the wood-creosote oil made by this company shows that but 37.4 per cent. distills over at a temperature of 600 deg. F. That is, 62.6 per cent. is composed of those heavy, permanent and insoluble bodies, that remain in the oil unaffected by the heat at this high temperature. The oil contains over 23 per cent. of the so-called heavy oil, which is insoluble in most substances, and 27.6 per cent. of wax or paraffine resin, and insoluble and non-volatile body, solid at ordinary temperatures, not affected by acids or alkalis and which tend to solidify in the pores of the wood. This is considered an especially valuable element in the preservation of timber. The wood creosote oil also possesses the chemical property of absorbing oxygen from the air and drying or resinifying, so as to produce a hard, water repellent and water-resisting surface. In conjunction with creosoting the company employs a carbonizing process, particularly for treating piles, by which they are subjected to dry, radiant heat in such a manner as to drive out the sap and char the outside surface. This charred timber resists the teredo as long as the charred surface remains intact, and when treated with wood-creosote oil the timber is proof against marine animals. The company is prepared to treat timber for bridges, trestles, ties and constructive purposes, and has done a good deal of work for the United States government and for railroad companies. The plant consists of four creosoting cylinders, 6 ft. in diameter and from 66 to 100 ft. long, with the necessary boilers, pumps and other apparatus. The company is prepared to treat timber of any length up to 100 ft. and inject into it from 8 to 20 lbs., or more, per cubic foot of wood-creosote oil. The plant for the manufacture of the oil consists of 16 oil retorts, each 6 ft. in diameter and 26 ft. long, with the necessary furnaces, worms, tanks, etc. Preparation is now making to increase the capacity of this part of the works from 25 to 50 per cent. The quantity of oil injected varies according to the uses to which the timber is to be put. Where exposed to decay alone, from 10 to 12 lbs. per cubic foot is generally considered as sufficient, while from 16 to 20 lbs. is regarded none too much in localities where the timber is particularly exposed to the attacks of marine animals. These particulars are taken from a little pamphlet recently issued by the company, copies of which may be obtained from Mr. F. C. Prindle, C. E., Engineer, Secretary and Treasurer of the company, Wilmington, N. C.

Electric Transfer Table of the Fitchburg Shops.

In the new repair shops of the Fitchburg railroad at Fitchburg is a transfer table worked by the Union Electric Car Company's system. The motor is geared to the front axle, and the gears run in an enclosed bath of oil. They are brass cut gears, and work with the least possible friction. The switch which governs the motor and controls the car is just above the motor, on a platform built out from the front of the car, as are also the reversing bar and the handle throwing in and out the clutch by which the motor is used either to propel the car in the desired direction or to draw off and on the cars to be changed from one track to another. The two shops are each 500 ft. long, and face each other. Each shop is divided into three divisions, separated by brick walls. In each division there are eight tracks, making twenty-four in each shop. Between these shops, which are 75 ft. apart, is the pit in which the transfer table moves. The car is 10 ft. long and 70 ft. wide, and runs on four rails laid in the pit. The table is run by the dynamo which lights the shops at night, and is connected by two overhead wires, on which run two trolleys, the trolley-poles being on the top of the house built over the front platform at the front of the table. Three men, one being at the dynamo, now run the table and draw on and off the cars.

Cairo Bridge.

The improvements contemplated by the Illinois Central Railroad at Mounds Junction, made necessary by the construction of the Cairo bridge, are of considerable magnitude. The company now owns there 370 acres of land, and will at once break ground for the location of tracks, depots and such other improvements as may be necessary to transact the business which will centre there upon the completion of the bridge, which will embrace all north and south bound through traffic. A large hotel will be among the first buildings erected. A 40-stall round-house will be built. The question as to the water supply has not yet been determined upon, but it is not improbable that the Cache River will be piped to a series of reservoirs. Large stock yards will also be located, and a connection with the Mobile & Ohio will be provided at the end of the Illinois approach. These improvements do not in the least interfere with the company's yards, tracks, etc., located here, and are only intended to relieve this end of the great pressure of through business, a great portion of which is left at Mounds Junction now, owing to the lack of yard room here.—*St. Louis Globe-Democrat*.

Railroad Crossings in Illinois.

A local road, known as the Calumet Line, is attempting to cross the Chicago, Burlington & Quincy near La Grange. The Burlington objects to the crossing unless it is made over

grade. Under the present law questions of this sort are referred to the board of Railroad and Warehouse Commissioners, and this board will consider this particular case in Chicago on the 26th. It is said to be the first case of the kind under the state law.

A Fast War Steamer.

The official trial of the United States Steamship "Baltimore," recently constructed by Wm. Cramp & Sons, took place last Saturday. The engines were run at full speed for 4 hours, under the management of the contractors, the data being taken by naval engineers. The "Baltimore" has twin screws, is 335 ft. long over all, 48½ ft. beam, and draws 19½ ft. of water when fully loaded. On the occasion of the trial the steamer did not have her guns and stores, but was loaded to the same displacement as she would have shown if fully equipped. The designs of this steamer were obtained from England, and called for engines to develop 10,500 indicated horse power. The Navy Department, in letting the contract, did not reduce the size of the engines, but only required the development of 9,000 indicated horse power, offering a bonus of \$100 for each additional indicated horse power developed during a trial of 4 hours.

The trial was made with forced draught, on the closed fire-room system, the air pressure varying from 2 to 2.7 in. of water. Picked coal (Pocahontas bituminous) was used in the furnaces. It is reported that the machinery worked well, with the exception of slight priming in some of the boilers, little water being used on the bearings. The official report of the trial has not yet appeared, but it is surmised that the average indicated horse power was about 10,300, in which case the contractors will receive the substantial bonus of \$130,000.

During the run the contractors were allowed 5 minutes in every 15 to fire and adjust the machinery, nothing being touched after each interval of 5 minutes until a signal was given; and during this time indicator diagrams were taken and observations made of steam pressure, vacuum, counter, etc. The following particulars of each hour's run have been published:

Hour.	Revolutions per min.		Steam pressure, lbs. per sq. in. above atmosphere.	Probable speed, knots per hour.
	Starboard.	Port engine.		
1st.....	118	116.6	118	20.7
2d.....	118.6	119.4	120.5	21.1
3d.....	118.8	122.7	118.5	21.5
4th.....	113.7	113.7	109	20.2
Avges.....	117.3	118.1	116.5	20.9

The above speeds are calculated from the pitch of the screws (20 ft.), making an allowance of 10 per cent. for slip, and may be modified somewhat in the official report.

Some experiments on turning the vessel when going at full speed were made after concluding the speed trial. Using both screws, the steamer turned in 6 min. 58 sec., and with one screw, in 7 min. 2 sec.; the diameter of the turning circle being 220 yds. When the engines were working in forward gear at full speed they were stopped and reversed in 15 sec.

Interlocking.

The Johnson Railroad Signal Co. has the contract for the erection of the interlocking at Millstone Junction, on the New York Division Pennsylvania Railroad.

It is said, with the appearance of authority, that the interlocking in the Jersey City yard of the Central of New Jersey will be put in service next Sunday.

Driver Brakes.

From the Master Mechanics' Report, just issued, we take the following data concerning driver brakes, which we published in the report of the committee on this subject at the time of the convention. The Westinghouse Co. report that up to the present time they have furnished about 7,500 sets of driver brakes. The American Brake Co. has supplied about 3,800 sets. The Eames Vacuum Brake Co. report their driver brake in use on 364 different railroads, and the Beals Brake Co. report 55 sets of its brake as having been applied to engines on six different roads.

Machine Shops Burned.

The machine shops of the Cincinnati Southern at Chattanooga, Tenn., were burned Sept. 13, causing a loss of \$25,000. Three engines were burned, and a large amount of valuable machinery destroyed.

THE SCRAP HEAP.

Attempted Train Wrecking.

Several attempts have lately been made to wreck passenger trains on the Baltimore & Ohio. An express train from Wheeling, due at Pittsburgh at 9 p. m., ran into a pile of ties placed on the track near Watonsville. A few nights after an express bound east was stopped by a pile of ties placed on the track near the same place. Fortunately the speed of the train was sufficiently reduced in each case to prevent any damage.

Canadian Competition.

The Canadian Minister of Customs has ordered a full investigation into the volume of the transit trade through Canada from one United States port to another United States port, and also the volume of trade passing through the United States destined to or from Canada from foreign ports. The question as to the probable effect on Canada railroads should the restrictions which have been suggested with regard to them competing with American lines is also to be carefully looked into, with a view to making provision against such a contingency should it arise.

A Useful Tramp.

At last a tramp has vindicated his right to walk on the railroad track. He was walking on the Chicago & Northwestern between Council Bluffs and Missouri Valley, and found a broken rail on an embankment on the outside of a curve. With considerable difficulty he roused some section hands and succeeded in having a passenger train stopped before reaching the broken rail. We trust that this tramp's services will be properly rewarded, but that they will be made no excuse for letting up on the class. For one tramp who saves a train there must be hundreds who do all sorts of damage, from stealing material up to wrecking trains and murdering trainmen.

A Chance for Immortality.

The Baroness Burdett-Coutts, whose London address is 1 Stratton street, Piccadilly, is anxious to have the photographs, with autographs, of all those members of the American engineers' party who attended her garden party at Holly Lodge, Highgate. These, if sent shortly, will enable her to have an album prepared as a Christmas souvenir.

International Railroad Congress.

The delegates to the International Railroad Congress at Paris were entertained on the 17th at a banquet given by the French railroad companies. A thousand invitations were issued. On Saturday the government is to give a banquet in their honor, and on Sunday President Carnot gives them a reception.



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EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

There appears to have been a little squabble at the Roadmasters' Convention at Denver over the election of officers. The local newspapers gave out that the "supply men" wished to have the old officers re-elected. Hardly anything more unfortunate could have been said, and nothing could be more unjust than the inferences that were at once drawn. To those who know the retiring officers, the episode means nothing, but those who do not know them may get wrong ideas of its significance. The secret of the whole matter is, probably, that the supply men mistook their relations to the convention and tried to take a hand in its politics. Obviously they had no business to say a word to any one concerning the election. The moral of the incident is plain. It is that the conventions of the Roadmasters, the Master Car-Builders and the Master Mechanics are accepting too much from the supply men in the way of entertainment, and if measures are not taken to restrict the importance and the prominence of this side of the conventions misunderstandings like that at Denver are sure to arise. Such misunderstandings must be injurious to the associations. The social and even the technical success of the conventions depend a good deal on the supply men. They are a very important element, but lately they have been the most conspicuous, and apparently the most important, element in the conventions. The proper proportion has not been kept up. The tail is beginning to try to wag the dog, and the result of such an inversion of functions can never be good.

We give elsewhere abstracts of two papers on rail-joints, read at the Denver Convention of the Roadmasters. Both papers have some good suggestions. Mr. Delane's shows a correct appreciation of the problem and formulates the conditions very well. The precise object of Mr. Barnett's tests of the strength of angle splices with and without slots we do not understand. Of course they are weakened by cutting slots in the bottom flanges. No one ever doubted that, and there was no occasion for subjecting them to tests to prove a fact so perfectly obvious. The only question was whether or not they were so weakened as to be liable to break through the slots in service. Concerning that, the tests show nothing. Why spike slots are cut in the middle of the bottom flange of the angle splice is well known. There are good reasons for it, if there are no sufficient objections to it. Some years ago it was learned that angle splices broke from the top downward. The top flange was gradually developed, and has to a great extent corrected that trouble. As long as cracks did not begin in the lower flange, it seemed admissible and even proper to cut slots for spiking to the joint tie. Lately, however, three-tie splices subject to heavy traffic have been found to fail in certain instances by breaking through this middle

slot, and it has been given up. We mentioned two such cases in writing on this subject in our issue of April 26. Whether or not other roads have had this experience we do not know, but the only way to settle the matter is by collecting data from actual practice. Nor do we attach any value to Mr. Barnett's theory that rails take an upward camber in the middle under the action of changes in temperature, and that, therefore, the joints must be lower than the middle of the rail. The difference of exposure of the head and flange is really very little, and if, as he suggests, the greater mass of metal in the head will part with its heat more slowly, and as a consequence contract more slowly than the flange, so on the other hand it will become heated through more slowly and not expand as rapidly as the flange. But, on the contrary, we know that rails on a yielding road bed are actually bent down in the middle, as if the base were gradually elongated under the constant tensile strain. When taken up they will be found permanently deformed in this way. Therefore to start with a rail half an inch low in the middle, as Mr. Barnett proposes, would seem to be sacrificing too much to the joint.

In Mr. Lauder's speech at the New England Railroad Club dinner last week he made a good suggestion that effort should be made to induce others than motive power and rolling stock men to enter the club and take part in the discussions. It is a curious fact that in the railroad clubs of the country the departments of bridges and buildings and track and signals have no representatives, and take no part in the discussions. These matters get but little attention at the monthly meetings of the engineering societies throughout the country, are hardly touched on by the superintendents' association, and of course can be but briefly and superficially treated in the annual conventions of the roadmasters' associations. If the railroad clubs can get the civil engineers and roadmasters to take a hand in their meetings they will introduce a good deal of fresh material which will be welcome. People are bound to get a little tired of the journal box and the standard axle for 60,000 lb. cars, thrilling as these topics are. If all the clubs would agree to drop these subjects for six months and then take them up again they would be astonished at the results of the "unconscious cerebration" which had gone on in the interval. As a practical step toward interesting the track men, Mr. Lauder proposed as the topic for the next meeting of the club "Permanent way and rolling stock, and their relation to each other," and moved that the New England Roadmasters' Association be invited to take part in the meeting.

The trouble about the rates from Kansas City to New Orleans is another instance of the tendency toward direct routes for traffic. The lines eastward from the Missouri and the Mississippi rivers are disturbed at the demand of the Kansas City & Memphis line for a lower rate to the Gulf. It would throw the central traffic rates out of balance. The Louisville & Nashville, for example, takes New Orleans traffic from St. Louis to the Ohio River at Henderson, and thence via Nashville, Birmingham and Mobile. The other has a comparatively straight line across this curve. Here we have the same questions of "goat's-horn" competition as in the Northwest. Both to New Orleans and to St. Paul the old routes are circuitous; had the conditions been reversed and the roundabout line been the newcomer, we should have heard much of the illegitimacy of the competition. How far do the real conditions alter the legitimacy? However we may think the long-established routes entitled to consideration, time seems to be settling things in favor of the shorter lines. In parts of Europe a road which is more than one-quarter longer than another between the same points is not considered a fair competitor. Our long and short haul seems working in this direction by actually limiting the through competition to the local basis. The legitimacy of the competition of circuitous routes is in this indirect way determined. Whether we are on the whole better off for a check to circuitous competition we do not now discuss, but certainly the shorter lines are gaining upon the longer routes both in law and in fact.

Deflections and Breakages of Steel Tires.

We have repeatedly before now had occasion to comment on the weaknesses of steel tires secured to the wheel centre by an internal rib or flange. In July, 1887, we published statistics of German observations on this matter, showing that the failures of tires of this class were very much more frequent than of those fastened by a retaining ring. In fact the proportion of breakages was as 1 to 16 in favor of the tires with re-

taining rings. It is true, however, that the number of wheels fitted with tires with internal ribs was small, and the results might have been quite different had the observations been extended over more wheels. Careful inquiry in Europe this summer, however, points to the conclusion that the improvements in methods of manufacture and in the quality of the steel used for tires have so increased their life that the section of the tire is no longer of controlling importance. We are assured that in recent experience on the continent breakages of tires with internal ribs are no more frequent than of those without. In the absence of actual statistics we do not state this as an unquestionable fact, but merely give it as the testimony of several European engineers and manufacturers.

The more frequent breakages of tires with an internal rib in times past have led us to indicate the theoretical defect of that design, but it is quite probable that they were due rather to defects in the material and mode of manufacture than to the design itself. Very likely when the failures took place through the bolt holes the fault was in the character of the steel used. In those cases where the failures were longitudinal along the tread the fault was to some extent due to the material, but principally to the rolling process and the design of the cross-section of the tire at the root of the internal flange.

Of late little has been heard of failure of steel tires in general, and even when they are worn down to the limit of thickness but few breakages occur. In order to determine the exact status of the question at the present time and to ascertain if much trouble is now experienced with broken tires, we have made inquiries of those railroad companies which are using steel tires, both with and without internal flanges. Out of a large number of replies only a small number of failures are reported of any sort or of either class of tire. In nearly all cases the tires were worn down to the limit of thickness. All but one of the replies expressed confidence in those tires having internal flanges, and the exception was in the case of a road which had never tried such tires. Several of the replies expressed a belief that the internal flange was an advantage, particularly when the tire was worn down nearly to the limit of thickness. In the case of one design of tire section the limit of admissible thickness has been reduced in one instance to $\frac{3}{4}$ in. without an increase in the number of breakages. Therefore, at the present time there seems to be no reason from experience why objections should be offered to the use of the internal rib, and the confidence of railroad men appears to be equally great in both designs of tire.

One objection to the internal flanged tire has been based upon the assumption that the tire changes form under the load as it rolls along; that is, that it is of elliptical form when loaded, and that the strains are constantly changing from tension to compression, and this supposed change of figure is assumed to start cracks on the inner circumference of the internal rib. It would appear, however, both from theory and from the tests of deflections which will be given later, that, in fact, tires on plate centres do not bend at all, because the axle load is transmitted directly to the rail by the web, unless the material of the centre be compressed. If the centre is compressed, then the compression is so slight that the bending is far too small to be measured by any ordinary method and the deflection is far within the elastic limit of the material of the tire; so far, indeed, that any number of repetitions of the bending which would take place within the life of the tire would produce no detrimental effect on the material of any portion, or even of the most strained fibres of the tire.

If the wheels have a spoke centre, then whatever bending does occur will take place between the spokes when the space, and not the spoke, is on the rail. The space between the spokes is very short, and the tire is stiffened by the rim of the wheel; therefore it would appear from those tests of tire deflections which follow, and which show how small are the deflections of an unsupported tire as a whole, that the deflection between two adjacent spokes must indeed be almost too small to be measured and too insignificant to be worthy of notice. If this were not the case, and the tire really did deflect enough to cause serious bending, then as soon as it was worn down considerably the deflection would be much increased and the breakages be much more frequent with thin than with thick tires; and, further, a majority of the breakages would take place crosswise of the tire, all of which is in no wise corroborated by experience. The form of the tire, if it be deflected in actual service, is that of a true circle flattened at the point of rail contact; the elliptical form could never be had unless the weight were applied at the top of the tire.

In order to determine the deflection of tires, both

plain and with internal flanges, when old and when well worn, it is necessary to make actual experiments. It is of no use to try to determine the deflection of the wheel as a whole under a load, because with the centre in position the deflection would be altogether too small to measure. Therefore the experiments made by the Brooks Locomotive Works, makers of the Thurber wheel, and the Paige Car Wheel Works, makers of the Paige wheel, and given in the following, were conducted with a view of placing the tire in the most disadvantageous position. That is, the pressure was applied to opposite sides of the tire, and without the support of a centre. The following are the results:

33-inch Thurber tire, $2\frac{3}{8}$ in. thick, with internal flange 1 in. thick and 2 in. deep, and a load of 20,000 lbs. applied to opposite sides of the tire, the deflection was $\frac{3}{16}$ in. With a load of 10,000 lbs., which represents nearly the average service load, the deflection would be, by estimation, $\frac{1}{8}$ in.

33-inch plain tire; the same tire as above with the internal flange cut out, $2\frac{3}{8}$ in. thick, the deflection under 20,000 lb. load, applied as before, was $\frac{3}{8}$ in., and, by estimation, the deflection for 10,000 lbs. would be $\frac{3}{16}$ in.

33-inch Thurber tire worn down to $1\frac{1}{2}$ in. thick, with internal flange 1 in. thick and 2 in. deep, the deflection under 20,000 lbs. was $\frac{3}{8}$ in., and, by estimation, under 10,000 lbs. it would be $\frac{1}{8}$ in.

33-inch plain tire; the same tire as above with the internal flange cut out, $1\frac{1}{2}$ in. thick, the deflection under 20,000 lbs. was $\frac{3}{8}$ in., and, by estimation, under 10,000 lbs. would be $\frac{3}{16}$ in.

30-inch Paige tire, $2\frac{1}{8}$ in. thick, with internal flange. Deflection under 25,000 lbs. was $\frac{1}{4}$ in., and, by estimation, under 10,000 lbs. would be $\frac{1}{16}$ in.

30-inch plain tire, $2\frac{1}{8}$ in. thick. Deflection under 25,000 lbs. was $\frac{1}{4}$ in., and, by estimation, under 10,000 lbs. would be $\frac{1}{8}$ in.

These results show clearly how small the deflection would be if the working load was applied even at the top of the empty tire and give some indication of the minuteness of the deflection of any design of tire, even when placed upon a slightly compressible centre. They also show the difference in stiffness of a tire with an internal flange and one without, and that a tire when worn down thin is better supported, if it has an internal flange, than if it has not, particularly if the centre be made with spokes. It is quite apparent that the deflection can seldom, under any ordinary conditions, be such as to bring dangerous tensile strains on the inner circumference of the internal rib.

Our Foreign Trade.

The recent visit to Texas of Mr. Charles Francis Adams and a party of Union Pacific officers, to which we referred last week, is suggestive. The avowed object of that visit was to see whether a feasible route could be opened to the ocean by the Gulf for the products of Washington and Oregon. San Francisco and other Pacific ports have been slowly but steadily gaining as ports for export during the last few years. Good judges are enthusiastic about the quality and quantity of grains which can be grown in the states named, and Mr. Adams is only ahead of time—as it is his business to be—in figuring on still further increases in exports from these states and the means by which the Union Pacific and the Oregon Short Line shall secure a large share of the traffic. If this grain can be turned away from a Pacific to an Atlantic port, so much the better for the long haul on Mr. Adams' roads.

This is a question in which Boston, New York and Baltimore are not very greatly interested, but it suggests a consideration of our general export question. Would a deep water harbor on the Texas coast have much effect upon New York? This cannot be answered except through experience. The Atchison must have had some large ideas of the value of a Galveston connection when it bought the Gulf-Colorado road at good prices, but nothing came of it. This Texas road is not more than earning fixed charges, and its value to the Atchison as an ocean outlet is but little, partly from the weakness of Atchison but more from the competition of the Atlantic seaboard. The *Financial Chronicle* publishes a table of exports and imports for four years, two of which are here quoted.

Ports.	Exports.		Imports.	
	Value.	Per cent.	Value.	Per cent.
New York.....	\$319,538,555	43	\$314,329,411	46.3
Boston.....	66,533,595	9	54,099,068	7.9
Baltimore.....	50,611,662	6.8	35,847,788	5.3
Philadelphia.....	29,774,911	4	33,753,317	4.9
Four ports.....	467,058,723	62.9	438,029,584	64.5
New Orleans.....	85,828,976	11.3	82,560,196	12.2
San Francisco.....	37,673,376	5	30,228,424	4.5
All other.....	153,840,724	20.7	128,706,626	18.9
Grand total.....	742,401,799	100	679,524,830	100

From the decline in percentages of New York and the four seaboard cities the *Chronicle* is inclined to

draw conclusions unfavorable to these ports as cities of export. But we do not think the figures quite justify this. Of course percentages form the only means of measuring the relative gain or loss; still, it is well to remember that on so large an amount as that passing through New York it takes a proportionately large change to have even a small effect in the percentage. New York's percentage fell from 46.3 per cent. in 1886 to 43 per cent. in 1889, but the actual value of the exports increased $5\frac{1}{2}$ millions. Boston increased nearly 11 millions and Baltimore nearly 15 millions, while Philadelphia shows a decrease. Our country is growing too large for us to become alarmed should any one port not receive an increase proportionate to the increase of the whole. So long as the ports of the East show an absolute though not a proportionate increase, the trunk lines will not need to consider any revision of their rates as against a deep water harbor on the Gulf.

Fortunately for us large crops in the United States are accompanied by poor crops abroad, hence fair prices this year may be expected. But should abundance here find abundance abroad, and the prices fall to the lowest level, then the question of an export rate, distinct from a domestic one, will have a direct interest for us. We can but think that then the injury of the decision of the Inter-state Commerce Commission, that the two should be the same, will become clearly manifest. Possibly then the competition of a Texas port would assume greater importance.

August Accidents.

Our record of train accidents in August, given in this number, includes 81 collisions, 82 derailments and 6 other accidents; a total of 169 accidents, in which 51 persons were killed and 253 injured.

These accidents are classified as follows:

COLLISIONS:				
Rear.....	40			
Butting.....	32			
Crossing and miscellaneous.....	9			
DERAILMENTS:				
Broken rail.....	1			
Loose or spread rail.....	3			
Broken bridge or trestle.....	6			
Defective frog.....	1			
Broken wheel.....	2			
Broken axle.....	7			
Broken truck.....	2			
Failure of coupling.....	2			
Fall of brake beam.....	3			
Misplaced switch.....	3			
Careless running.....	3			
Bad loading.....	1			
Cattle on track.....	6			
Washout.....	7			
Landslide.....	2			
Accidental obstruction.....	1			
Malicious obstruction.....	6			
Unexplained.....	27			
OTHER ACCIDENTS:				
Boiler explosion.....	1			
Broken parallel or connecting rod.....	1			
Broken axle.....	1			
Miscellaneous.....	3			
Total number of accidents.....	169			

The causes of collisions, where given, were as follows:

	Rear.	Butting.	Crossing and other.	Total.
Trains breaking in two.....	7	1	1	9
Misplaced switch.....	1	1	..	2
Failure to give or observe signal.....	4	5	..	9
Mistake in giving or understanding orders.....	6	8	..	14
Miscellaneous.....	6	2	2	10
Unexplained.....	23	15	6	44
Total.....	40	32	9	81

A general classification shows:

	Col- lisions.	Derail- ments.	Other.	Total.	P. c.
Defects of road.....	11	..	11	22	7
Defects of equipment.....	9	16	4	29	17
Negligence in operating.....	28	6	..	34	20
Unforeseen obstructions.....	..	22	2	24	14
Unexplained.....	44	27	..	71	42
Total.....	81	82	6	169	100

The number of trains involved is as follows:

	Col- lisions.	Derail- ments.	Other.	Total.	P. c.
Passenger.....	35	29	2	66	27
Freight and other.....	117	53	4	174	73
Total.....	152	82	6	240	100

The casualties may be divided as follows:

	Col- lisions.	Derail- ments.	Other.	Total.	P. c.
KILLED.					
Employes.....	20	8	..	28	55
Passengers.....	6	11	..	17	33
Others.....	4	2	..	6	12
Total.....	30	21	..	51	100
INJURED.					
Employes.....	57	60	5	122	..
Passengers.....	41	81	..	122	..
Others.....	5	4	..	9	..
Total.....	103	145	5	253	100

The casualties to passengers and employes, when divided according to the classes of causes, appear as follows:

	Pass. killed.	Pass. injured.	Emp. killed.	Emp. injured.
Defects of road.....	3	30	2	14
Defects of equipment.....	11	8	..	18
Negligence in operating.....	11	65	20	61
Unforeseen obstructions and maliciousness.....	2	..	3	18
Unexplained.....	1	10	3	11
Total.....	17	122	28	122

Thirty-four accidents caused the death of one or more persons, and 42 caused injury but not death, leaving 93

(54 per cent. of the whole) which caused no personal injury worthy of record.

The comparison with August, 1888 and 1887, shows:

	1889.	1888.	1887.
Rear collisions.....	40	43	30
Butting.....	32	30	34
Crossing and other collisions.....	9	15	1
Derailments.....	82	121	64
Other accidents.....	6	13	8
Total.....	169	222	137
Employes killed.....	28	43	45
Others.....	23	13	84
Employes injured.....	122	109	89
Others.....	131	102	234
Passenger trains involved.....	66	77	51
Average per day:			
Accidents.....	5.45	7.16	4.42
Killed.....	1.61	1.77	1.16
Injured.....	8.16	6.54	10.42
Average per accident:			
Killed.....	0.301	0.248	0.941
Injured.....	1.496	0.914	2.358

There were five bad accidents in August, in which 18 persons were killed, 11 of them being passengers. A sixth case, that at Kinsman, Ill., the 26th, occurred under very exciting circumstances, but fortunately no one was killed. The collision at Forest Lawn, N. Y., is classed as unexplained, though its causes have doubtless been made clear enough to the officers of the road. In the investigation of this accident a photograph of the wreck was placed in evidence to show that the engineer of the express had not reversed his engine before the collision.

Collisions at stations are quite infrequent, considering the fact that circumstances which tend directly to invite them occur almost every week at many places. The fixing of station limits, the establishment of good and sufficient signs or signals to warn engineers of the location of those limits, and a system of discipline which shall insure that reasonable heed is paid to those warnings are matters deserving more attention than is given them. A fixed station distant signal is better than any practicable system of flagging by hand. This is certainly true of the track circuit system as used on the Boston & Albany and other New England roads, and it is, on the whole, doubtless true of a common semaphore to be pulled by hand. The objection to the latter is that a stationman may some time forget to pull the signal up at the proper time; but proper discipline ought to regulate this at least as well as it does many other equally important matters. The plan of having the signal stand normally at caution, to be pulled down by the station operator when a passenger train is due, is not so impracticable as many believe it to be, and it is also true that a hand signal can be erected and maintained for less money than many suppose.

The disaster on the Knoxville, Cumberland Gap & Louisville, the 22d, was particularly distressing because the train carried an excursion party celebrating the opening of the road, and the victims were prominent citizens. We have classed the accident as from negligence in operating. There was indeed a fatal "defect of road," but as the track appears to have been very poor, its condition must have been well known to the general management, so that the failure to run slowly was the specially blameworthy point; to blame the road department might be grossly unjust. The bridge where the car tipped off had no guard timbers, and the ties were not blocked apart, so that a derailed car was almost sure to go down. The butting collision at Petroleum, West Va., the 23d, resulted from a most culpable blunder. The two trains (671 and second 646) had orders to meet at Silver Run, but subsequently No. 671 received a copy of a double order, which related to that train only so far as a freight train was using some of its time, and in this order was a meeting point between the freight train and second 646 at Petroleum. The crew of No. 671 took the freight train's order as their own. The conductor and engineman of 671 had been on the road for over 30 years. The essential error in this case was ignoring the previous order, which made the correct meeting point. In reading the longer order and in following it these men must have mentally assumed that the earlier order had been annulled; but they had had not the slightest official intimation to that effect. Our readers will recall an interesting discussion in these columns a few months ago on the question of annulling orders. Unquestionably, the formation of a mental habit which shall tend to prevent men from disregarding an order until they are sure that it is safe to do so is an important duty of those who give trainmen their instructions.

The derailment at Sarver, Pa., the 16th, apparently resulted from most culpable carelessness. The causes are quite common and appear in connection with accidents in these columns every month. But a significant point in connection with them in this case is the fact that the derailment occurred on a road whose passenger advertisements are couched in very confident, not to say boastful, terms. The jury in the case of the fireman killed at Alden, N. Y., Aug. 23, say that the engineer of the passenger train fell asleep at his post, the result of overwork.

The collision at Kenwood Junction, N. Y., the 2d, seems to have been clearly attributable to the reckless running of the southbound train, but the case is sharply suggestive of the dangerous condition of hundreds of junctions, and grade crossings also, in this country. Wherever two railroads come together a junction is put in, but very often the amount of business between the roads is extremely small, and therefore will not justify much expense, and, as a consequence, the cheapest switches are used, there is an entire absence of signals, and the most scanty service is provided. The spectacle of a single track junction out in the woods or in an inaccessible swamp with nothing more elaborate than a common red lantern for sig-

mailing and no attendant for the switches, except a station agent, who has to be operator and man-of-all-work, is so common as to make one shudder when he thinks of the propensity that railroad men have for running trains under such circumstances as these at as high speed as would be allowable at a fully equipped and manned junction.

The collision with buffer blocks at Philadelphia is a kind of accident that appears frequently in the British reports, but which we do not often hear of in this country. Whether we are more careful or whether our poverty of headhouse stations is the cause of this state of things, we will not pretend to say.

Of the passengers killed, four, and of those injured, one, were drovers or others riding in the cabooses, a practice which we have frequently drawn attention to heretofore.

Yearly Consumption of Car Axles.

We have lately had occasion to investigate somewhat the question of the average life and mileage of car axles, with special reference to the yearly consumption for repairs and for new work. Any such estimate is difficult to make, from the lack of available statistics, but the data collected are sufficient for a rough approximation to the number of axles used.

On the Pennsylvania Railroad the number of axles supplied for repairs to cars in freight service is 16 per year for each 100 cars owned by the company. This is the average of four years, and includes all axles supplied for repairs, of which of course a certain number went to foreign cars. On the other hand, Pennsylvania cars received axles when off the road, and perhaps the average was about correct. In the passenger service the average for the same length of time was 210 axles per year per each 100 passenger cars owned by the company. The limits of dimensions below which car axles are withdrawn from service on the Pennsylvania are as follows:

	Journals.		Shop		Wh'l-fits.	
	Stan'd. size.	Road limit.	Stan'd. limit.	In.	Limit.	In.
Passenger.....	3 3/4	3 3/4	3 5/32	4 3/4	4 3/4	
Freight—60,000 lbs. capacity, new standard trucks.....	4	3 3/4	3 3/4	5	4 3/4	
Freight—50,000 lbs. capacity, new standard trucks.....	4	3 3/4	3 3/4	5	4 3/4	
Freight—50,000 lbs. capacity, old standard trucks.....	3 3/4	3 3/4	3 9/32	4 3/4	4 3/4	
Freight—40,000 lbs. capacity, old standard trucks.....	3 3/4	3	3 3/4	4 3/4	4 3/4	

Accompanying these limits is a circular of instructions from which the following is an extract, explaining the proper interpretation of the limitations:

"It will be noticed that there are two journal limits called 'road limit' and 'shop limit'.

"The 'road limit' is for the use of inspectors, who are hereby instructed not to allow any journal which to their knowledge has reached this limit to remain in service, but to send the car to shop, or to report the locomotive to the round house foreman, as the case may be, for change of axle. Inspectors will be required to know that no journal on which they have renewed the bearing has reached this limit, and they should take all other opportunities afforded, such as when boxes are responded, to look at and, if necessary, to measure the journals in order to guard against any journals which have reached the 'road limit' remaining longer in service.

"The 'shop limit' for journals and the 'wheel-fit limit' are for the use of shop foremen and any persons having charge of the renewals of wheels and axles or shop repairs of any kind to trucks, and they will be required to know that no axle which has reached either of these limits shall be placed in service, or shall be allowed to go from shop into service under any class of rolling stock for which either limit has been reached; but this does not prohibit the placing of axles which have reached the limit under one class of rolling stock, in service under another class whose limits are less.

"All Master Mechanics, General Foremen and General Car Inspectors will be required to see that these orders are complied with."

It is interesting to note the mileage of passenger car axles before they are removed because of failure or as unfit for passenger service, and yet sufficiently good for freight service. The following are some of the best mileages made by axles in passenger service before being removed and scrapped as unfit for either passenger or freight service:

Miles.	Miles.	Miles.	Miles.
201,340	199,907	195,575	191,911
188,678	184,150	181,322	180,897
169,224	164,036	163,085	157,136
155,504	154,063	154,033	151,247

The following list shows some of the best mileages of axles before being removed as unfit for passenger and yet good for freight service:

Miles.	Miles.	Miles.	Miles.
303,562	261,226	257,584	228,027
220,227	207,892	200,082	198,699
194,755	194,683	185,798	183,853
178,970	175,922	174,915	174,530
170,259	169,808	160,855	

A very large percentage of all the axles removed show a mileage of over 100,000 miles.

Two hundred and forty of the axles supplied to passenger cars in 1884 had been sent to the scrap pile in May, 1889. These axles had an average mileage of 102,355 miles; 844 of those put under passenger cars in the same year had an average of 93,895 miles before they were removed as good for freight service. Of those axles put into passenger service in 1885, 225 have been scrapped, having an average mileage of 88,201 miles, and 440 have been removed and entered into freight service, having had already an average mileage of 95,051 miles.

The Chicago, Burlington & Quincy statistics for seven years show the average number of axles used for repairs for both home and foreign cars to be 370 for each one hundred passenger cars per year and 12 for each one hundred freight cars per year.

Taking the average of the Pennsylvania and the Burling-

ton figures, 14 new freight car axles are required for each 100 cars each year, or for the 1,000,000 cars now running in freight service there would be required 140,000 axles for yearly repairs. For the 28,200 cars running in passenger service (Poor's Manual) 81,780 axles would be required, or a total of about 222,000 for all repairs. The number of axles required for new cars, on the basis of the building of 1888, is about 438,000, or in all the yearly consumption of car axles may be put down at 685,000 for construction and repairs.

No great progress seems to be made in the work of preparing for holding the World's Fair of 1892 in New York. The Executive Committee on Finance have held several meetings recently, but have declined to make public the result of their deliberations, and have as yet presented no report to the General Committee. It seems to be the general opinion that this committee will take no action before a site for the Exhibition is chosen. Until the last meeting of the General Committee on Site and Buildings (Sept. 13), it was rumored that this committee was waiting for the Committee on Finance to act. Be that as it may, nothing positive has been accomplished, although several weeks have elapsed since the first meeting of the committees. Possibly a site may be selected this week. On Friday last, when the General Committee on Site and Buildings received a report from its Executive Committee, it practically took the matter into its own hands, resolving that the whole committee would visit the proposed sites on Tuesday and Wednesday of this week and reach a conclusion immediately. Numerous letters have been received by the committee, recommending that the site, when referred to the Grand Central Depot as a centre, should be reached in thirty minutes and for five cents, and if these conditions prevail the choice of the location can easily be made. The daily papers have published good illustrated descriptions of all available sites, so that the general reader has the data requisite for an intelligent choice; and if the immense property interests which are evidently trying to capture the committee are defeated, there seems to be little difficulty in reaching a speedy and satisfactory conclusion. Last week Mayor Grant addressed the mayors of prominent cities in the United States and the Governors of the several states, asking their co-operation in the project for an exhibition at New York in 1892. Naturally he has received replies of varied characters: western mayors generally favoring Chicago, the mayor of Washington agreeing if that city is not selected, to do all that he can to make the exhibition in New York a success, and several mayors holding the matter over for consideration. Mayor Grant has also called a meeting of the Committee on Legislation for Thursday of this week. While New York is deliberating, Chicago is acting, being vigorously engaged in raising money to secure the exhibition for that city. Mr. Edmund C. Stanton, in a recent interview, calls attention to the importance of the immediate appointment of a Director General. The committee on Site and Buildings has appointed a sub-committee to determine the number and size of the main buildings, with their approximate cost. It will be seen, therefore, that the Committee on Finance have some reason for withholding their scheme for raising funds, preferring to wait until they obtain some idea of the amount of money required.

One point of much interest which has been examined by American railroad officers who have visited England this year is the great Edgell yard of the London & North-western, near Liverpool. This is a yard for sorting and "marshaling" freight cars by gravity. It comprises over 57 miles of tracks and is said to have cost £2,000,000. This yard is described by Mr. W. M. Ackworth in his recent book, "The Railways of England." A much better description was given in the *Railroad Gazette*, April 15, 1887. Through this yard all the outward and inward freight traffic of the London & Northwestern passes. About 3,000 cars are handled in 24 hours as a maximum, not as an average, but the yards have a capacity of 5,000 to 6,000 cars per day. Some 54 trains are made up and sent out between the hours of 4 p. m. and 6 a. m. All cars arriving from Liverpool to be sorted and made up are hauled to the summit of an incline and deposited on the reception lines. From these they are dropped by gravity through the sorting sidings and "gridiron" tracks, and came out made up in trains, the cars arranged in the order of the stations at which they are to be left. From 80 to 83 men are employed. We have no estimate or statement of the relative economy by which the great expenditure for this yard is justified, but Mr. Ackworth states that the work done there in 1887 "implied the employment of the whole time of nearly 400 engines, which collectively performed about 2,000,000 hours' work at a total cost of precisely £497,437."

A correspondent has sent to us an ingenious explanation of the recent case of a fire started on a Pennsylvania vestibule train by the friction between the plates at the tops of the vestibules. He suggests that the springs holding the plates together were probably so weak as to permit pretty free motion; that the adjoining cars were unequally loaded, or their springs were of considerably different strength, so that the vertical play was different in the two cars and the consequent movement between the vestibules was multiplied. The explanation has apparently been worked out with considerable pains, but it could have been much briefer. That is, it could have been summed up in the celebrated answer to the old riddle, that the boy lied. There was no fire started by the

friction between the vestibule plates of a Pennsylvania train, and it is highly improbable that any fire ever will be started in that way.

In estimating the damages due to a wilful libel courts and juries are apt to be as "liberal" as a pension commissioner or a country jury in a railroad case. This disposition is due to a general appreciation of the fact that a nimble lie has staying qualities which successful contradiction can never entirely vanquish. The communication in another column from an officer of the Rome, Watertown & Ogdensburg Railroad is an unanswerable reply to the sudden attack upon their method of testing the Jull snow plow at Oswego last March, which recently appeared in a contemporary publication, and it will probably be successful in correcting false impressions, only because the libel has not come to the attention of many railroad officers who are interested in the subject.

The General Time Convention's Committee on Car Mileage and Per Diem Rates has submitted a report which formulated in great detail a very excellent working plan for the organization of car service associations. A meeting has recently been held of lines interested in the formation of such associations at Council Bluffs, Topeka, Wichita, Atchison and other Western points, and it is thought that organizations will be at once made on the plan of the Chicago association. It is said that they will be directed for the present by Mr. E. D. Moore. On the whole, the prospect for the successful extension of this system is very bright.

NEW PUBLICATIONS.

A Bibliography of Geodesy. By J. Howard Gore, B.S., Ph.D., Acting Assistant United States Geodetic Survey, etc.

This is a large pamphlet of 200 pages, which appears as an appendix to the Report for 1887 of the Superintendent of the United States Coast Survey. It is made up entirely of titles of works and articles on the subject of geodesy. While the number of people to whom it will have any interest is very limited, to such people it will be a work of very great value. The compiler explains that this list has grown out of his own needs in writing a history of geodesy. He has had the co-operation of librarians and scientific men of various countries, and doubtless has made the most complete bibliography on the subject that has ever been issued. The intention was to include only such works as treated directly of the figure of the earth, or described operations which could be used in determining that figure. The only digression from this plan is in the case of the pendulum, where the theoretical side is also included.

Report of the Proceedings of the Twenty-second Annual Convention of the American Railway Master Mechanics' Association, held at Niagara Falls, June 18, 19 and 20, 1889.

This report is issued by Secretary Sinclair with his customary promptness. Besides the proceedings of the annual convention, the pamphlet contains the constitution and by-laws, list of committees for 1889-90 and a list of members. It has a large and apparently very excellent index.

General Specifications for Highway Bridges of Iron and Steel. By J. A. L. Waddell, Kansas City, Mo. Second edition, revised and enlarged. For sale by the author; price, 25 cents.

We reviewed this pamphlet at some length at the time of its publication, nearly two years ago. This second edition has been enlarged nearly one-half by the addition of several instances of failures of highway bridges and other minor matter, and by a new chapter which gives the discussion of the first edition by a number of engineers, which was published in full in the *Journal of the Association of Engineering Societies* for November, 1888. A portion of the new matter is an entertaining description of a new style of highway bridge, which is so novel that we cannot forbear reprinting it in full.

During the last year, or since the first edition of this pamphlet was issued, there has come into prominence a new style of structure for highways, viz.: the cable suspension bridge. In its original form it consisted of strands of twisted telegraph wire forming cables less than 1 in. in diameter and spaced 2 ft. apart, to support 2 in. transverse planks, clamped occasionally thereto. These cables passed over two wooden bents, resting on mud-sills or piles, and around anchor piles, or "dead men," in each bank.

The prominent feature of these bridges, and the one which commends them most highly to county commissioners, is their cheapness. They cost three or four dollars per lineal foot, and are sold for six. Moreover, the price per foot does not increase with the length of span, because the same number and size of cables are employed whether the clear span be 50 ft. or 150. In fact, the actual cost per foot is really less for a long span than for a short one.

Another great advantage which this class of bridge possesses is that it can be very quickly erected at any time and anywhere; for telegraph wire is a merchantable commodity that can be purchased at almost any hardware store in the country, and, barring the iron nails, this is the only metal required.

A certain company had at first the exclusive privilege of furnishing the country with this great boon, but very shortly another company stepped in to divide the honor and the profit. This new company effected some improvements (1) on the original design, the most notable of which are as follows: First, they substituted gas pipe bents for the wooden ones, and gas pipe piles braced by stone walls for the anchor piles or "dead men." Then they divided the clear span into three panels, putting an upward camber in the cables by means of a heavier cable on each side of the bridge, using gas pipe for the floor beams. The beautiful feature of this arrangement is that by twisting on the outer cables with iron bars, enough initial stress can be brought upon the other cables and the floor beams to produce rupture without any live load whatsoever upon the structure.

The great superiority of these cable bridges over the ordin-

any truss bridge is partially offset by one unimportant feature, viz., that the former are absolutely unsafe. This is not, perhaps, so serious a matter as one might at first imagine, because the traveler in passing over a high truss bridge is uncertain as to whether he is risking his life, while in crossing over one of the new cable bridges he is positive of it.

The author was called upon, a few months ago, to inspect and report upon one of these improved style cable bridges just completed in Southern Kansas. The following extracts from his report may prove useful to county commissioners in the West, because the remarks concerning this particular structure will in general apply to all bridges of this type: "On account of the upward camber in the roadway cables between the gas-pipe piers, the horizontal 4-ft. gas pipes, termed by the contractor 'needle beams,' must act as ordinary floor beams, for which purpose they are absurdly weak. The live load ordinarily specified for county bridges would demand floor beams twelve times as strong as these 'needle beams.' It is practicable to remove these and replace them by heavy timbers, and I would recommend your so doing, were this the only serious fault in the bridge, which, I assure you, is by no means the case.

"The ordinary live load previously mentioned would strain the wire in the main cables to 49,000 lbs. per square inch, provided said wires were parallel and equally strained. But as they are twisted in a manner that is very irregular when compared with machine-twisted cables, it is not improbable that some of the strands are strained as high as 60,000 lbs., or even 65,000 lbs. per square inch, especially in the neighborhood of the beam hangers, where the cable is split to allow the hangers to pass through. * * *

"My calculations show that the floor cables have been strained from 25,000 to 30,000 lbs. per square inch merely by the adjustment of the main cables. * * * The 2-in. floor planks would be overstrained by a wheel load of 2,000 lbs. under the assumption of perfect adjustment and equal deflection of floor cables; but as several causes tend to prevent anything approaching such equality, it is evident that the planks must be seriously overstrained by passing loads. I observed their action when a lightly loaded wagon was going over the bridge, and found the deflection and vibration to be excessive. What will it be, therefore, under the passage of a full load after the cables have had time to get still more out of adjustment?

"The tendency to overturn the anchorages cannot be calculated, owing to the fact that the working stresses on the cables are indeterminate; but this much it is easy to determine, viz., that the proportions of the anchorages are such that good practice would not permit of the cables being strained more than 13,000 lbs. per square inch, which amount is certainly exceeded, even when the live load is confined to the middle span. * * * In short, there is no portion of this structure, unless it be the gas-pipe piers, that will provide sufficient strength for ordinary loads. * * * The best thing to do with the affair is to take it down and replace by a properly designed iron or combination bridge.

"The building of these wire cable bridges ought to be prevented by law, for they are death-traps of the worst description. From all I hear I judge that the structure which I have examined for you is by no means the worst of its class to be found in Kansas. Whether you pay for this bridge or not is no affair of mine; but for your own sake I most seriously advise you to take it down, and to warn the other county commissioners in your state against building any more structures of this pattern."

Master Car and Locomotive Painters' Association—Twentieth Convention.

The twentieth annual convention of the Master Car and Locomotive Painters' Association was held at Chicago, commencing Sept. 11, with a good attendance from various parts of the country. The meeting was called to order by President Samuel Brown, Old Colony, with an appropriate speech.

The roll call showed 64 active members present. Secretary Robt. McKoon read his annual report, which showed that at the last meeting, held at Cleveland, there were 153 members in the Association, including honorary members. The cash receipts during the year, including a balance of \$281 from the previous year, were \$508.13, and the disbursements were \$261.56, leaving a balance on hand of \$246.57.

The election of officers resulted as follows:
President, A. E. Barker, Chicago & Northwestern.
First Vice-President, Wm. Lewis, Grand Trunk.
Second Vice-President, E. L. Fetting, New York & New England.
Secretary and Treasurer, Robert McKoon, New York, Pennsylvania & Ohio, Kent, Ohio.

Mr. McKoon was the only nominee for secretary and treasurer, and received the unanimous vote.

The first subject on the programme, how to paint the heating parts of locomotives, was taken up, and the following papers were read:

PAINTING HEATED PARTS OF LOCOMOTIVES.

A. L. HORTON, Lake Shore & Michigan Southern, said: When the steel and iron domes come from the copper-smiths and boiler-makers, where they are annealed over a charcoal fire in order to form them into proper shape, there is a gas from the charcoal which adheres to the steel and iron and is a great enemy to paint. Wash the surface with soft soap, to allow the paint to dry hard and prevent it cracking. The brasses are to be washed with alkali and sandpapered with No. 2 sandpaper.

Formula for mixing and applying paint:
Priming Coat.—Fifteen pounds keg white lead, 1 lb. best lampblack, 1½ gallons kettle-boiled oil, 1½ gallons extra coach japan, 1½ gallons quick-drying engine varnish, ½ gallon turpentine. Let stand 24 hours before using.

Filling Coat.—Thirty pounds fine dry purple iron clad, 40 lbs. keg white lead, 2 lbs. best lampblack, 3 gallons extra coach japan, 1 gallon turpentine. Let stand 24 hours before using.

Knifing Putty.—Same as filling. If wanted for a stiff paste add a little gilder's whiting.

Oil Black.—Three pounds Eddy's best lampblack, 1 gallon extra coach japan, 2 gallons kettle-boiled oil, 2 gallons turpentine. Let stand 24 hours before using.

Mode of Application.—First day, one coat of priming in the morning; second day, one coat of knifing in the morning; third day, one coat of filling in the morning; fourth day, one coat of filling in the morning; fifth day, one coat of filling in the morning; sixth day, sandpaper in the morning; seventh day, one coat of oil black in the afternoon; eighth day, one coat of body color and varnish in the morning; ninth day, one coat of body color and varnish in the afternoon; tenth day, one coat of varnish.

The priming must be well brushed out and laid off by the light touch of the brush. The great trouble with most journeymen, they do not take time to brush their priming coat, which is the most particular point about painting or coating on iron.

Some painters will try to see how much surface they can

go over in a short time, and therefore do not brush it enough. It will dry on the outside and not next to the iron, which will not allow it to clinch good, and will cause cracking. Brushing well causes it to dry in one-half the time, and also makes it free from brush marks all the way through the different coats, giving a good surface. Use emery cloth to cut down the uneven surface on the filling, after which go over with No. 0 sandpaper.

I do not use rough stuff, simply because I do not think it is good for the iron, as you are liable to rub through to the iron, causing rust spots.

I keep all my colors in Murphy's paint mixers, where they are kept free from skins and dirt and are always ready on short time, which is very often the case, especially in a locomotive paint shop.

W. T. HOGAN, Atchison, Topeka & Santa Fe Railroad, said: A great amount of responsibility depends upon the primer. We have a great deal to contend with; such as intense heat and extreme cold, which produces expansion and contraction; hence it must be tenacious and elastic, and from personal experiments I would recommend the primer to be composed of two parts pure boiled linseed oil and one part turpentine, made stiff with Prince's mineral and ground fine, thinned with turpentine, applied freely and well brushed out.

Second coat should be somewhat similar to priming coat, except that it is changed according to its office, which is to more thoroughly fill the pores and grain of the iron and unite itself solidly with the priming coat. It should be composed of one part pure boiled linseed oil and two parts turpentine, made stiff with Prince's mineral and ground fine, thinned with turpentine, applied freely and well brushed out.

Third coat, or first of rough stuff, should possess elastic toughness and unite itself solidly with the under coats and be of a nature to cut down without clogging the stone; it is then absolutely necessary that it should be more or less porous, in order to rub well, but by no means should the pores be as large as the head of a pin, as I have often seen them, as it is disastrous to subsequent coats, owing to its extreme absorbing qualities, and it does not unite itself as solidly in a coarse state as it would were it ground moderately fine. It should be composed of two parts slow rubbing varnish and one part best nonpareil japan made stiff with Prince's mineral and ground moderately fine, care being taken that it is thinned to its proper working consistency with turpentine, applied freely and well brushed out, avoiding brush marks as much as possible. There is one great evil which I fear exists in many of our leading shops, which is the idea that rough stuff can be applied with any ordinary help such as cleaners, etc.; who, practically speaking, do not even know how to handle a brush. As a result we find it very uneven, full of brush marks applied in a careless manner. If it were the amount of paint applied to a job that would add to its desirability I would most earnestly say pile it on; but the less paint we can get on and get the required surface the better results we attain, and in our estimation as much precaution should be exercised as with any coat of paint applied, which assertion I am positive many of my brother painters will corroborate.

Fourth coat, or second coat of rough stuff, should be composed of equal parts of varnish and japan, made stiff with Prince's mineral and ground moderately fine, thin with turpentine and apply.

Fifth coat, or third coat of rough stuff, composed same as second coat. Before adding apply two or three handfuls of dry ochre, which will increase the speed of rubbing and also act as a guide coat.

Putty composed of two parts slow rubbing varnish and one part best nonpareil japan made stiff with Prince's mineral and ground fine; when ground up, adding equal parts of dry mineral and dry lead until it can be used without sticking to the fingers. When scraping in, soften putty with slow rubbing varnish, adding a little turpentine, care being taken not to apply any more putty or plaster than is absolutely necessary. Putty on first coat of rough stuff.

Preparatory coat for body, color composed of one part slow rubbing varnish and two parts best nonpareil japan made stiff with Prince's mineral and ground fine, thin with turpentine and apply.

First coat of color: color should be ground in best nonpareil japan; thin with turpentine and add one pint of slow rubbing varnish to every 20 lbs. of color, and apply.

Second coat of color: mix same as first, but add ¼ of a pint of slow rubbing varnish to every 10 lbs. of color; when dry, sandpaper lightly with No. 00 sandpaper, care being taken not to stain color. The object is to remove all small pits, and when varnished you have a very clean job.

I use a medium drying varnish that will dry free from dust in about 6 hours at a temperature of about 70 to 75 degrees; it, of course, is not as elastic as a slow drying varnish would be, consequently is not as sensitive to steam, smoke, draft, etc., which we are apt to have to contend with in varnishing locomotives.

	Days.
Priming	2
Second coat	1
First coat rough stuff	1
Putty	1
Second coat rough stuff	1
Preparatory coat	1
First coat of color	1
Second coat of color	1
First coat of varnish	1
Second coat of varnish	2
Total	14

No doubt you have noticed I do not use any japan or dryer of any kind in my former coats of paint. My object in doing so is to obliterate so far as possible any element that tends to crack or peel. It is a well known fact that the ingredients that go to make up a dryer have been a source of great annoyance to our fraternity, and in securing the required results without this aid is a benefit which experience has taught me to be of great value. You can reduce the time of painting to nine days by plastering on first of rough stuff sanding, kalsomining and repeat, varnishing if necessary.

On Thursday morning the second topic on the programme was taken up, being

INSIDE FINISH OF A FIRST-CLASS PASSENGER COACH.

On this topic J. W. HOUSER, Cumberland Valley, said: At our convention held in Cleveland last year I believe I was the first to advocate the claim for kalsomine, and I remember there was a great diversity of opinion and I found myself almost alone in its use, but I still think it is good.

I do not doubt that all the gentlemen who gave their views had satisfactory results with their own individual methods. There is a great difference of opinion throughout the country as to filler. Our method of preparing it is as follows: Twenty five lbs. of kalsomine, 1½ gallons coach japan, ½ gallon raw oil. Mix it thoroughly by running through the paint mill, reduce with turpentine to the desired consistency, apply with a partly worn brush, and when set sufficiently clean the flat surface with a wide glazing or putty knife, the molding with sticks and waste. When dry follow by sandpapering lightly, then give one coat of good inside car

varnish, putty the next day, allowing same from 36 to 48 hours to harden, afterwards sandpaper and follow with two coats of varnish, allowing 48 hours between coats.

I sometimes only give a coach two coats of varnish on account of being pushed for time, but always prefer three coats, allowing it to stand from three to five days before rubbing and oiling.

JOSEPH J. MURPHY, Louisville & Nashville, said:

In the first place we will suppose that the inside woodwork of the car under course of treatment is of ash or oak, and as ash or oak are the most porous or open grained woods we have to deal with, if we can bring them up to a good and durable finish with varnish we will have no trouble in using the same method with the other species of wood of closer grain now used in car construction.

The first item on the list is what will make the best filler, so as not to injure the natural beauty and color of the wood and at the same time fill the pores thoroughly and permanently. For this filler I use corn starch mixed as follows: Five pounds cornstarch, wet with ½ gallon raw oil, ¼ turpentine and ¼ gallon japan gold size. This mixture is applied freely, brushing well into the pores of the wood and will set ready for cleaning off in about half an hour after being applied. Clean carefully, leaving none of the filling upon the surface. After the filling is dry, and it should have at least 10 hours to do so, sandpaper lightly and apply a thin coat of equal parts turpentine and rubbing varnish, using no shellac, as shellac has a tendency to color the wood, besides the thinned varnish is easier applied and far better for the work. For this coat give one day to dry, then hair off and give a coat of clear rubbing varnish, not the grade known as inside rubbing but the same kind of rubbing varnish as is used on outside of cars. This coat should stand for two days before sandpapering, and sandpaper as closely as possible without cutting through to the wood, then apply the second coat of rubbing varnish, which should also stand two days to dry, then hair off again and apply the last coat of rubbing varnish, which should stand as long as time will permit, or at least four days before rubbing down with pumice stone and water. But before rubbing down with water the edges and all panels should be well painted with, say two coats of oil paint to prevent the absorption of water while in process of rubbing down. This painting upon the back of the panels is important and should not be left undone. The painting can be very easily applied while the different coats of varnish are being put upon the surface of the panels. As to the rubbing, I will merely say that it should be done carefully, so as not to cut through or remove the varnish upon the sharp edges of moldings or carvings, if any are used in the wood finish of the car. And after the work is rubbed down it should not be oiled, as is generally done, to give it a finer finish. I have used for some time a preparation that is far superior to oil, but as it is on the market for sale, and my natural modesty forbids me upon this occasion from advertising any firm's goods, I will simply say that a small amount on a piece of rag or waste passed over the work leaves it with a beautiful polish and without that greasy look that oil gives. This final wiping, as I will call it, had better be done after the carpenters are all through with the trimming up of the car and just before it is turned out of the shop for service.

WM. O. QUEST, Pittsburgh & Lake Erie, said: The following is my formula for mixing, time and mode of application:

Priming oil and filling material.—The first coat of priming oil is composed of equal parts prepared hard drying linseed oil and turpentine. This mixture will dry firm and hard in 48 hours. We use cornstarch as the base of our filler, which is colored to suit the wood, and is mixed in equal parts hard drying linseed oil, rubbing varnish, gold size Japan and turpentine.

Now we will suppose the inside wood finish of the coach is complete and turned over to the painters for treatment on Tuesday morning, July 9, 1889.

We first carefully look over the work, remove all spots or hands marks, thoroughly dust and apply over the entire surface a free coat of the priming mixture. We allow this to penetrate into the wood by standing four or five hours, then wipe all surplus oil with clean waste or cotton rags.

July 10 and 11—Drying.

July 12—Give light sandpapering, dust, putty up and apply our filler, doubling up our gang in order to do the work in one day if possible. We apply the filler with an ordinary paint brush (well worn), rubbing it well into the wood; then allow it to set until it assumes a whitish appearance (which will be from twenty-five to thirty minutes), then thoroughly scrape or rub the filler into the pores of the wood, using for all flat surfaces a three-inch glazing knife, pointed sticks and cotton rags to clean out the crevices in the ornaments or moldings, carefully cleaning as we go along so as to leave on the surface as little of the filler as possible.

July 13 and 14—Drying.

July 15—Moss off the surface, look it carefully over, and if necessary re-putty nail holes; dust and apply a coat of quick drying hard oil finish, slightly cut with turpentine. This we use in the place of shellac, and believe it is much better adapted for the purpose.

July 16—Drying.

July 17—Moss off and apply a medium coat of coach rubbing varnish over the entire surface, with the exception of the window-sills, which are now coated with finishing varnish only.

July 18 and 19—Drying.

July 20—We used skilled labor only. Cut this coat of varnish with No. 0 sandpaper; dust carefully and then was off clean, using water brushes to clean out the crevices, etc. Dry off with chamois skin, dry and apply the last or finishing coat, which is a combination of equal parts rubbing and coach finishing.

July 21, 22 and 23—Drying.

July 24—Rub to a smooth, even surface with fine pulverized pumice stone and water.

July 25—Rub to a complete finish with rotten stone and oil. Up to this time we have had fifteen working days, and the interior finish of our coach is complete and ready to receive furniture and inside trimmings, which in the meantime have also been brought up to a finish.

The third subject on which papers were read was as follows:

FILLING FOR ENGINE DRIVING WHEELS AND OTHER ROUGH CASTINGS.

JOHN G. KEIL, Chicago & Alton, said:

Take a set of engine driving wheels (six wheels to a set) and if very rusty and full of scales begin on all flat parts with a flat steel wire brush and remove all scale and rust. As the brush cannot be used on the spokes and other round parts, take a file and have the end flattened and sharpened to a sharp, smooth, square edge, and with this file remove all rust and scale. This part of the work can be done by a laborer, and will take from seven to ten hours. As this is a very important part of engine painting (namely, getting off all rust or scale), I would suggest that all master painters should see that their help be properly instructed as to the results of leaving any scale or rust on wheels, domes or tanks. Some of the results of wheels not properly cleaned are first pinholes of rust showing through the varnish. After a few months of wear these

specks of rust unite and cause flaking off. Although all rust does not begin before the painter starts his job, he is held responsible if his engine shows up bad after a few months of service. Therefore, gentlemen, it is very important for us to find out what constitutes the best filling and what will wear the longest on iron and steel. In my opinion, any mineral oxide will fill the grain or pores of the iron better than any other pigment or material in the market.

For priming take 6 lbs. dry mineral, $1\frac{1}{2}$ pints of raw oil, $3\frac{1}{2}$ pints of turpentine, $\frac{1}{2}$ pint Japan. This priming dries quite flat and is dry enough for second coat next day, or in extreme cases of hurry it can be put next morning. Perhaps some member at this point may say, "Why use dry mineral or why not use dry white lead or keg lead?" My first reason for not using lead is because it is of a corrosive nature; second, because the present method of rotting the lead with chemicals leaves it more susceptible to rust iron or steel. At this point I advance the same theory as the house painter in flattening walls with lead. If he first puts on a coat of thin glue size, the lead does not come in contact with the chemicals or alkalis in the plaster. If he does not put on a size, his coloring is burned out in a short time. I therefore think that lead on iron and steel will increase the rusting instead of being a protection to the iron.

Again, why use raw oil instead of boiled oil? My reason for using it is that it dries all the way through and dries harder. Boiled oil is more liable to skim over, and in my opinion raw oil has better wearing qualities. Raw oil must be used with greater care than boiled oil, for in case of an overdose of Japan it will cause delay in drying, as more Japan than is necessary will retard its drying.

For second coat I use the same formula as for priming, except add about one pound of dry mineral and then to suit with turpentine. After the second coat is thoroughly hard, I take the following mixture: One gallon rubbing varnish, one quart of Japan, one pint of turpentine, and make a stiff, hard putty of half dry mineral and dry white lead. This putty must be well pounded. After putting all large holes, I glaze all uneven parts. Next day I thin this putty down to about the consistency of rough stuff. Second day this coat will sandpaper down quite smooth, and leaves a good surface ready for first coat of flat drop black. If the job is not quite as smooth as desired, I give 1 coat flat and 2 coats varnish drop black, and finish with 1 coat locomotive rubbing varnish and 1 finishing varnish. The time consumed in doing a set of wheels in this way is about 25 hours, or at a cost of about \$6. The total time consumed is about 8 or 9 days. Although the work can be done in this short space of time and in general will wear well, I do not recommend or approve of this way of doing work. Still, where a master painter is asked to get his engine out in the shortest time possible, I think this method is both economical and durable, considering the time consumed. Also when the superintendent of motive power or master mechanic says get the engine out three or four days earlier, and it will earn enough in that time to pay for painting and meet the demand of the company in giving transportation.

I will give the record of several engines as they appear on my record book: Engine 145, painted May, 1887, finished in 9 days, was out 26 months, and cleaned up, and is still in good condition; engine 29, painted November, 1887, is still "O. K.," engine 104, painted October, 1887; engine 87, out 14 months. All of these jobs show a good record, especially against rusting.

Mr. JOHN S. ATWATER, Hinckley Locomotive Works, gave the following formula: Twelve pounds keystone. Filler dry. Six pounds white lead in oil, $1\frac{1}{2}$ quarts each of rubbing varnish and Japan. Grind in mill and reduce with turpentine.

On the topic of Rubbing and Finishing Varnishes, Mr. ROBERT McKEON, New York, Pennsylvania & Ohio said: If the car is coated with a pretty flat color from the priming up to the varnish, then I should recommend a coat of rubbing varnish applied over the dead color. This gives you a foundation for the succeeding coats of wearing body varnish, as its quick drying prevents it being absorbed by the raw color to the extent that the finishing varnish would be, and the oil in the varnish, which is the life of it, in place of being in the gum for the protection of the surface, is sucked up by the dead color. Now if the car is brought up to the varnish with an elastic color, that is, a larger portion of oil in it, it is plain that there is not that power of absorption in it that there is in the flat or dead color.

The question might be asked here, which is the best of the two colors, elastic or flat, to hold the varnish? My plan is to use an elastic color, consequently I use no rubbing varnish over it. If I should do so, I would expect to see a cracked surface on my work in a few months. Therefore, in giving my experiments and the results obtained with the two grades of varnish, remember that I have always had an elastic color to apply it on. By the term elastic I do not mean to say that I have any gloss on the color, but I prepare it so that it will dry down to a soft velvet-like appearance, and I can glaze on any of my body colors without the aid of the pounce bag to prevent the gold from sticking.

About twelve years ago I entered into a series of tests with rubbing and finishing varnish. Previous to this time I had used rubbing for the undercoats, giving but one coat of finishing, but, having some trouble with the varnish cracking, I started out to find the cause and, if possible, apply a remedy. My first move was to abandon varnish color entirely on the body of a car, which I had been taught to use from the earliest days of my apprenticeship in the car-shop. In place of the third or last coat of color being mixed with rubbing varnish, I gave the car the required number of coats of flat color and applied a coat of rubbing varnish; this I rubbed, then decorated and striped and applied a second coat of rubbing, rubbed again, and gave one coat of finishing.

In my experiments at this time I turned out several cars with two coats of finishing varnish over flat color, the decorating and striping being done before any varnish was applied; these were put in service at the same time with the cars that had the two coats of rubbing and one of finishing. I examined them frequently and found that the car with two coats of finishing varnish stood equally as well as those with the two coats of rubbing and one of finishing, and another thing I observed was that there was no cracking on the cars turned out with finishing varnish only, an evil that I had to contend with on cars with the two grades of varnish on them. I made myself fully satisfied of this fact, that two coats of finishing varnish was equal to two coats of rubbing and one of finishing. I have, therefore, finished all my work for the past 12 years with but two coats of varnish, and am well pleased with the results.

Rubbing varnish, as I have generally found it, is of a brittle nature and has but little wearing qualities in it. It is intended merely for filling up, or producing a surface, while the wearing body varnish is intended for service and durability.

Some may ask if three coats of finishing varnish would not be better than two coats. I answer, no; unless you expect the car to remain in service over twelve months before coming in the shops to be cleaned and revarnished. I have had cars finished with two coats come in at the expiration of one year and clean up and varnish nicely, giving as before, two coats of finishing, and the second year it will do still better service than the first, as the paint has a more solid and less

porous body to resist the dirt and hot cinders, as well as the sudden changes of weather which it is continually subjected to.

Now the second part of the subject, which relates to the quick method of varnishing, deserves our consideration. I do not believe that any practical car painter ever introduced the so-called repeating process in varnishing. He may have been forced to do it, as many of us have to do many things that we know is positively injurious and detrimental to the wear and durability of the painting.

About eight years ago the repeating process in varnishing was considerably agitated, and some of us gave it a trial. I finished several cars, putting on the varnish 24 hours between coats, but I have never yet found out where the advantage was. It certainly could not be found in the increased durability; it did not dry with any better lustre, nor did it flow out as smoothly, but it dried rather with a dim and sunken appearance. It was not any drier when put in service than the car that had four days between coats, which is the time I give my first coat of varnish to dry. At the same time I gave two cars three coats 24 hours apart and turned them out at the same time as those I gave but two coats. At the end of 12 months the cars came in and were cleaned up and revarnished, but nothing could be said in favor of the three-coat job, varnished in three days, over the second coat job, which was varnished in five days. As for getting the car into service any quicker by this rapid method of varnishing I fail to see how it can be done. Another very important matter was that the cars done by the repeating process did not clean up as well as those that had the proper time given them for the varnish to harden between coats; the dirt seemed to be imbedded deeper in the varnish.

We all know color will work by putting on the second coat before the first is fairly dry. What kind of a job do we often see on hurried painting where two or three coats are applied in one day; it dries spotted, sinks in and leaves an enameled surface. Two coats of varnish on a car body, well dried before being exposed to the weather, is better than three coats put on hurriedly and turned out for service before being dried. We have all observed the drying of varnish, and know that it takes double the time for two coats of varnish to dry together that it would require for either coat alone.

The lustre is destroyed by this repeating method, the first coat of varnish not being dried. The next coat prevents its drying properly, as this will skin over on the surface in from 12 to 20 hours, according to the make of the varnish; this second coat, therefore, shuts off the oxygen from coming in contact with the first coat, and such a mass of varnish drying together is the principal cause of what we term flattening. The brilliancy of varnish is preserved only when the surface on which we apply it is perfectly dry and hard. Now, if the lustre of the varnish is gone the durability is greatly impaired. The resistance to the atmosphere lies mainly in the solid and smooth varnish that covers the body of the car. I certainly cannot indorse the quick method of applying varnish. Careful and repeated tests in the matter have fully convinced me that there is neither economy nor increased durability in it.

The president appointed the following committee for the ensuing year:

Advisory Committee—E. L. Fetting, N. Y. & N. E.; Samuel Brown, O. C.; George H. Gillingham, C. & N. W.; John Ratterbury, C. & N. E. & P.; M. W. Stines, Barney & Smith Manufacturing Co.; W. W. Hogan, A. T. & Santa Fe.

Committee on Information—Robert McKeon, N. Y., P. & O.; H. W. Walton, P. & W.; F. W. Wright, M. C.; A. P. Sweet, D. L. & N.; J. G. Keil, C. A. & St. L.

Committee on Tests—William Litner, B. & C. R. & N.; A. T. Schroeder, C. M. & St. P.; A. S. Coleman, Intercolonial; George Paulis, L. E. & W.; W. McNabb, B. & O.

Boston was decided upon for the next place of meeting, and, after passing a vote of thanks to the officers of the association, the supply men, the hotel people, and the members of the press for courtesies received, the convention adjourned.

TECHNICAL.

Locomotive Building.

Twenty new locomotives, built by the Rogers Locomotive Works at Paterson, N. J., have been added to the rolling stock of the Louisville & Nashville. Ten are consolidations and ten are switch engines.

The Brooks Locomotive Works of Dunkirk, N. Y., have received an order for 15 new engines for the Cleveland, Cincinnati, Chicago & St. Louis, 10 of which are to be moguls for freight traffic, and the remainder are to be switching engines. It is stated that the company will soon let the contract for four passenger cars.

The Brooks Locomotive Works have recently shipped four 18 x 24, ten-wheel passenger engines, to the Chesapeake & Ohio; four 19 x 24, moguls and two 18 x 24, six-wheel yard engines to the Illinois Central, and five 18 x 24, moguls to the Flint & Pere Marquette; also some passenger and ten-wheel freight engines for export to Cuba. They are employing 700 men, and have lately put in a new hydraulic plant and a new iron truss roof on the erecting shop, with overhead trolleys.

Judge David J. Brewer, of the United States Court, has authorized the Receivers of the Missouri, Kansas & Texas to purchase 10 heavy freight mogul and 7 passenger locomotives. The 15 mogul engines purchased in March last have been used to replace other engines which had been removed by the Missouri Pacific, the lessee at the time of the receiver's appointment.

The Chesapeake & Ohio is said to have let a contract for 3 new passenger engines and 20 freight locomotives.

Five more 10-wheel fast passenger locomotives have been ordered for the Michigan Central. The first 10-wheeled engine was placed on the Michigan Central two years ago.

Car Notes.

The Fitchburg is building at its shops in Fitchburg, Mass., 100 box cars, 50 cars for the shipment of carriages and 25 platform cars.

The Louisville & Nashville road is reported in the market for 1,000 more freight cars. Since March 1 the L. & N. has added 1,500 to its freight equipment.

Two hundred new cars have been ordered for the Kanawha Dispatch freight line over the Cleveland, Cincinnati, Chicago & St. Louis and Chesapeake & Ohio roads. The cars are to be equipped with air brakes and Janney car couplers.

Several car companies have been asked to bid on 500 cars for the Cincinnati, Hamilton & Dayton; the same number for the Cincinnati, Washington & Baltimore, and 200 for the Tennessee Midland.

The Indianapolis Car & Manufacturing Co. has received an order for 100 coal cars from the Choctaw Coal Co., of Denison, Tex.

The Lake Shore & Michigan Southern road has just placed a contract with the Indianapolis Car Works for 500 coal cars, October delivery, and with the Lafayette Car Works for the same number, November delivery; and the company

will give out orders immediately for 300 more coal cars, 300 gondola cars and 300 box cars.

One hundred new stock cars have been ordered by the Cleveland, Cincinnati, Chicago & St. Louis.

The United States Rolling Stock Co. is enlarging the capacity of its Anniston shops to 20 cars per day.

The Burton Stock Car Co. has recently finished at its shops at Wichita, Kan., 16 special palace horse cars for various lines and shippers. The company has also completed for Budd Doble, of Chicago, a palace horse car, 52 ft. long and equipped with the Miller and Hinson couplers, Westinghouse air brake and signal and Miller platform. Its capacity is 16 horses besides the sulkies, harnesses and other racing paraphernalia. The company is now turning out two horse cars per day.

Bridge Notes.

The contract to build an iron bridge across the Nonconah Creek on the Horn Lake road, near Memphis, Tenn., has been awarded to John H. Walker at \$4,500.

The contract for the iron superstructure of the bridge to be erected at Duncan's Island, between Perry and Dauphin Counties, Pa., has been awarded to Dean & Westbrook, at \$15,600. The structure will be 700 ft. long.

The King Iron Bridge Co., of Cleveland, O., has received the contract at \$24,000 to build the Poteau bridge near Fort Smith, Ark. The piers of the bridge are to be of iron.

A commission of United States engineer officers appointed by the Secretary of War is investigating the matter of a bridge over the Ohio between Louisville and Jeffersonville, Ind. The commission consists of General C. B. Comstock, Colonel C. H. Sutor and Major C. J. Allen.

The superstructure of the channel span of the Pennsylvania bridge over the Ohio River, at Steubenville, has been completed and the false work removed, leaving the channel clear for the passage of boats. The bridge consists of seven approach spans of 232 ft. each and one channel span of 312 ft. The superstructure has been built by the Edge Moor Bridge Works.

The Milwaukee Bridge & Iron Co. has begun arrangements for its new plant in the Kinikinnic Flats, near Milwaukee, Wis. The estimated cost of the undertaking is \$80,000.

The commissioners of Ohio County, W. Va., will erect a 70-ft. iron bridge across Wood's Run. W. C. Smith, County Engineer, Wheeling, W. Va., will give information.

The New York, Lake Erie & Western has begun the building of a new draw bridge over the Hackensack River on the Newark Branch. The draw span will be a double track iron plate girder deck bridge, 142 ft. long, and will be swung by a steam engine. The length of the approaches, consisting of pile trestles, will be 260 ft. each, arranged in such a way that hereafter deck plate girders can be substituted for them, thereby making the whole structure permanent. The contractor for the foundation and the woodwork is Mr. D. S. Cofrode. The ironwork is being done by the Riverside Bridge and Iron Works, of Paterson, N. J.

The following bridge companies have been awarded contracts to build bridges in Baltimore County, Md.: The Wrought Iron Bridge Co., of Canton, O., Pratt truss iron bridges over the Gunpowder Falls, on the Beckleysville road, at \$1,738; over Gwynn's Falls, at McDonough, at \$1,036.35, and over Herring Run, at Coxon's Mill, at \$1,855.28. The King Iron Bridge Co., of Cleveland, O., have the contract for a similar bridge over Herring Run, near Taylor's Church.

The Superintendent of Public Works at Albany, N. Y., has let the contracts for building the superstructure of the following bridges: An iron bridge at Prospect street, Lockport, appropriation \$1,000; the superstructure to the Rochester Bridge & Iron Co., at \$2,026. Other bids were: Hilton Bridge Co., \$2,200; Shepard & Son, \$2,628; Groton Bridge Co., \$2,600; King Iron Bridge & Mfg. Co., Cleveland, O., \$22,000.

For an iron bridge at Culver street, Rochester, \$16,000 was appropriated; the substructure was awarded to Weider & McMahon, at \$10,020, and the superstructure to the Rochester Bridge & Iron Co., at \$4,175. The other bidders for superstructure were: Hilton Bridge Co., \$4,790; Shepard & Son, \$4,976; Groton Bridge Co., \$5,657; King Iron Bridge & Mfg. Co., \$4,600.

The contract for the erection of an iron viaduct bridge across Town Creek, at Gallatin, Tenn., has been let to the Smith Bridge Co., of Toledo, O. The bridge will be 78 ft. long, 60 ft. wide, 44 ft. roadway and double walks 8 ft. wide. The whole bridge will cost \$3,000.

The following bids for the construction of a plate girder highway bridge at Yonkers, N. Y., were received: Daniel R. Kelly, \$5,900; King Iron Bridge & Manufacturing Co., \$6,200; Penn Bridge Co., Beaver Falls, Pa., \$6,650; Dean & Westbrook, New York City, \$6,400; Berlin Iron Bridge Co., Berlin, Conn., \$5,975; Milliken Bros., \$7,592; J. E. Budington, \$5,995.

The following proposals for an iron bridge near Mahwah, N. J., were received: Dean & Westbrook, New York, \$1,600; Variety Iron Works, \$1,604.68; Penn Bridge Co., Beaver Falls, Pa., \$1,610; Riverside Bridge Co., \$1,645; Wrought Iron Bridge Co., \$1,654; Groton Bridge Co., Groton, N. Y., \$1,664; Berlin Iron Bridge Co., East Berlin, Conn., \$1,692; King Iron Bridge & Mfg. Co., Cleveland, O., \$1,750; Pittsburgh Bridge Co., \$1,760. The contract was awarded to Dean & Westbrook.

The old bridge over the railroad at Covington, Ky., will soon be removed and a new one erected. The new bridge will be about 165 feet long.

New bridges are proposed at Benton Harbor, Mich., to cost \$12,000; at Auburn, N. Y.; at Lowell, Mass.; over the Rock River at Rockford, Ill., and at Union City, to be built by the town of Naugatuck, Conn.

Manufacturing and Business.

The Beals Railway Brake Co. has received an order from the New York Locomotive Works, Rome, N. Y., for six sets of engine brakes for mogul engines.

The Glenmore Iron Foundry, of Philadelphia, is manufacturing the Glenmore patent grate surface for stationary and locomotive boilers. The manufacturers claim that its construction makes it exceedingly strong and durable, and prevents warping. The grate is in use on the Pennsylvania and the Kings County Elevated, and numerous steamboat lines.

The contract for the iron roof over the new buildings of the Providence Gas Co., at Providence, R. I., has been awarded to the Berlin Iron Bridge Co., of East Berlin, Conn. The same company is also erecting the iron building for the new tube mill at Torrington, Conn., and has the contract for the new jail at Windsor, Ont.

The contract for the metal work to complete the Philadelphia City Hall tower has been awarded to the Tacony Iron & Metal Co. It will take about four years to complete the work. It is estimated that the work will cost \$325,000.

The Pittsburgh Locomotive Co., of Allegheny City, Pa., is erecting a building 50 x 100 ft. and 3 stories high, to be

used for office purposes. It will have a pressed-brick front and will cost \$10,000.

The C. A. Treat Car Wheel Works, at East Chicago, Ind., have been completed, and are now ready to engage in the manufacture of cast-iron car wheels as soon as the condition of that branch of business will warrant it.

The Fowler Steel Car Wheel Co., of Chicago, has completed the erection of its Bookwalter or Robert steel plant, making the first blow Sept. 5. The start was very satisfactory, the quality of the steel produced being very fine. The product of the steel plant will be used in casting wheel-blanks to be rolled into solid car wheels.

The Milwaukee Car Wheel & Foundry Co. is to build a plant in Milwaukee, Wis., near North Avenue Station, for the purpose of manufacturing car wheels and doing a general foundry business. The plant will consist of two buildings, each 80 x 145 ft., one for a car-wheel and the other for a general foundry, also a building 60 x 72 ft. as a cleaning and shipping room. Wheels will be manufactured in the Barr contracting mill under the Barr patents, and the capacity will be 160 wheels per day. The company have been organized with a capital stock of \$90,000, and with the following officers: D. C. Green, President; S. M. Green, Vice-President; and Gustave Scholle, Secretary and Treasurer. The works will be in operation by Nov. 15.

The Abendroth & Root Mfg. Co., of New York, has just concluded a contract for 12 miles of spiral riveted pipe, to be used in the construction of the Nicaragua Canal.

The Westinghouse Electric Light Co., of Pittsburgh, Pa., has been awarded a contract for lighting Allegheny City with electricity. The contract amounts to \$141,158.

Iron and Steel.

The Chicago Forge & Bolt Co., of Chicago, has acquired possession of the property of the Straight Fibre Iron Co., whose rollingmill was burned down some time since, and it is rebuilding the plant. The company will roll bar-iron for use in manufacturing bridges, bolts, nuts, etc.

The Crozer Iron Co., of Roanoke, Va., has been chartered, with Samuel Crozer, of Upland, Pa., President; W. H. H. Robertson, of Philadelphia, Pa., Treasurer, and F. A. Weston, of Upland, Pa., Secretary, to build and operate furnaces and coke ovens, etc. The capital stock is to be \$100,000. This company succeeds the Crozer Steel & Iron Co., whose property was sold at auction last week.

The Swindell & Smythe Co., of Pittsburgh, Pa., has contracted with the Lynn Iron Co., of Lynn, Pa., for the erection of a regenerative gas plant.

Among recent orders taken by the Continental Iron Works, of Brooklyn, for corrugated boiler flues are the following: 24 furnaces for the government cruiser "Maine"; 12 furnaces for Morgan Iron Works, N. Y.; 4 furnaces for Neale & Leavy, Philadelphia; 12 furnaces for Quintard Iron Works, New York, and 2 for the Albion Iron Works, Victoria, B. C.

Reuben Miller, William Metcalf, Charles Parkin, Charles Metcalf and Walter F. Parkin, will next week apply to the Governor for a charter for the Crescent Steel Co., of Pittsburgh.

The East Chicago Foundry Co., of East Chicago, Ind., now has its main building under roof, and a large 50-ton crane is already in position. The company will make a specialty of rolls for rolling mills and castings of a similar character.

The Sharon Steel Casting Co., of Sharon, Pa., is enlarging its works by the erection of a machine shop 60 x 80 ft. and two and one-half stories in height. The works of the firm are being operated to their utmost capacity, and have enough orders on hand to keep them busy for some months to come.

The Clinton Rolling Mill, at Pittsburgh, formerly owned and operated by Graff, Bennett & Co., is now being operated by the Clinton Iron and Steel Co., composed of J. W. Friend, F. N. Hoffstat, W. H. Bailey and others.

P. H. Carr, of Boston, has bought the entire plant of the Old Colony Iron Works, at East Taunton, Mass., mill, machinery, water privilege, about 50 tenements and 160 acres of land.

The Colorado Coal & Iron Co. has discontinued its rolling mill at Denver Col., and has concentrated all its works at Bessemer, near Pueblo, Col. Extensive repairs in the rebuilding of heating furnaces and in the substitution of machinery for manual labor have recently been made at the rolling mills and steel plant, and improvements have also been made in the iron-pipe works.

No. 5 puddle mill, recently erected by the National Rolling Mill Co. at McKeesport, Pa., was put into operation during the present week. The new mill has 12 double puddling furnaces, hammer, and all equipments necessary to its successful operation.

At the annual meeting of the stockholders of the Thomas Iron Co., in Hokenauqua, Pa., Sept. 10, the proposition of an English syndicate to sell the company's plant, real estate, cars, locomotives, furnaces, railroads, mines and leases was presented. The offer of \$3,500,000 would bring the stock's value up to about \$87 a share. Its last quoted price was \$70. There are 40,000 shares of stock of par value of \$50. The company, it is said, owns bonds and securities not included in sale, swelling the value of shares to about \$105. The offer of the syndicate was accepted.

The blast furnace of the Cameron Iron & Coal Co., at Emporium, Pa., is turning out about 110 tons of foundry iron per day. The firm is erecting a foundry and machine shop, and has also under consideration the question of erecting an additional blast furnace.

The blast furnace of the Norton Iron Works, at Ashland, Ky., is out of blast at present, being relined and repaired. It will be blown in again as soon as repairs are completed.

Application for incorporation has been made by the Canada Iron Furnace Co., of which P. H. Griffen, car wheel manufacturer, of Buffalo, N. Y., Robert Schott, Sheffield, England, and several Canadian capitalists are the directors. The chief place of business is to be at Montreal. The capital stock is \$200,000. The company is to manufacture iron and steel, to operate in coal and iron mines, foundries, rolling mills and steel converters.

New Machine Shops.

The shops of the Louisville, St. Louis & Texas road are to be located in Cloverport, Ky., which town subscribed \$20,000 to have them built at that point. The shops were at Henderson, but a short time ago they were destroyed by fire.

The Ohio & Mississippi is working 770 men at its new shops in Washington, Ind. A sufficient number of houses have been erected to accommodate the men as boarders, but some 200 of them would move their families there if there were houses for them to reside in.

Car Heating.

The Consolidated Car Heating Co., of Albany, has perfected a storage system for maintaining heat where the service requires cars to be detached from the locomotive for a considerable

time. A new and improved return system which prevents all drip on the track or in stations has also been designed. The company recommends the McElroy system for use in cars already equipped with Baker heaters and the Sewall direct steam heating for cars in regular service not liable to interchanges, and furnishes either Sewall or McElroy or all-metal or ball-joint couplers, as may be desired. The company makes the important announcement that it has established shops and depots of materials and appliances at Albany and Chicago, where it will carry in stock everything necessary to enable it to equip trains on short notice, and it is prepared to furnish at any desired point experienced men to oversee the execution of orders, and to give instruction to railroad employees in the management of car heating apparatus.

Ventilation of the Victoria Bridge.

Work is now in progress by the Grand Trunk Railway Co. for the ventilation of this structure by removing a portion of the roof. This has been done for the northern or western half of the bridge, and the same plan will be at once carried out with the southern half. A strip of the roof has been cut away about 20 in. wide along the central line of the bridge. This opening being immediately over the smokestacks allows the escape of the gases and not only adds to the comfort of the passengers and workmen, but is beneficial in retarding corrosion of the iron. Before cutting the opening the sectional area of the iron-work was re-enforced. In fact, the re-enforcement is about double the strength of the portion removed. This has been done by placing T-bars immediately over the sides of the structure.

Continuous Brakes in Europe.

It has finally been decided to introduce continuous brakes on the Belgian state railroads for freight train service. Belgian papers heartily commend this action of the authorities and point with satisfaction to the circumstances that Belgium will be the first of the European governments to take this important step.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Georgia Railroad & Banking Co., quarterly, 2½ per cent., payable Oct. 15.

Missouri Pacific, quarterly, 1 per cent., payable Oct. 15.

Nashville, Chattanooga & St. Louis, quarterly, 1½ per cent., payable Oct. 10.

New Castle & Beaver Valley, quarterly, 2½ per cent., payable Oct. 1.

Oregon Railway & Navigation Co., quarterly, 1½ per cent., payable Oct. 1.

Sunbury & Lewiston, 3 per cent., payable Oct. 1.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Cleveland, Cincinnati, Chicago & St. Louis, annual, Cincinnati, Oct. 30.

Cincinnati, Jackson & Mackinaw, annual, Van Wert, Ohio, Oct. 2, at 1 p. m.

Hereford, special, Cookshire, P. Que., Sept. 30, for the purpose of acting upon a proposed mortgage.

Hudson Tunnel Railway Co., annual, New York City, Oct. 1, at 12 noon.

Knoxville Belt, special meeting at Knoxville, Tenn., Nov. 2, for the purpose of acting upon a proposed mortgage.

Lake Erie & Western, annual, at Bloomington, Ill., Oct. 2.

Louisville & Nashville, annual, at Louisville, Ky., Oct. 2. Transfer-books close Sept. 19 and re-open Oct. 3.

Louisville, New Orleans & Texas, annual, 39 South Court street, Memphis, Tenn., Oct. 7, at 11 a. m.

Northern Pacific, annual meeting of stockholders and special meeting of the preferred stockholders, Oct. 17. Transfer-books close Sept. 16, and remain closed until Oct. 18.

Ohio & Mississippi, annual, at Cincinnati, O., Oct. 10, 10 a. m.

Oregon & Transcontinental Co., special meeting, Portland, Or., Nov. 5, to take action on the question, which has already been submitted to the directors, whether the capital of the company shall be reduced or the company shall be liquidated and go out of existence.

St. Clair Tunnel Co., annual, at Detroit, Mich., Sept. 26.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *General Time Convention* holds its fall meeting at Hotel Brunswick, New York City, Oct. 9, at 11 a. m.

The *American Association of General Passenger and Ticket Agents* will hold its next semi-annual meeting in Atlanta, Ga., Sept. 17.

The *New England Railroad Club* meets at its rooms in the United States Hotel, Beach street, Boston, on the second Wednesday of each month, except June, July and August.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at its rooms in the Phenix Building, Jackson street, Chicago, at 2 p. m.

The *New York Railroad Club* meets at its rooms, 113 Liberty street, New York City, at 7:30 p. m., on the third Thursday in each month.

The *Central Railway Club* meets at the Tiff House, Buffalo, the fourth Wednesday of January, March, May, August and October.

The *American Society of Civil Engineers* holds its regular meeting on the first and third Wednesday in each month at the House of the Society, 127 East Twenty-third street, New York.

The *Boston Society of Civil Engineers* holds its regular meetings at its rooms in the Boston & Albany station, Boston, at 7:30 p. m., on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at its hall, No. 67 Washington street, Chicago, at 7:30 p. m., on the first Tuesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in St. Louis on the first and third Wednesdays in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the house of the Club, 1,125 Gerard street, Philadelphia.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Penn Building, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at the Club rooms, No. 24 West Fourth street, Cincinnati, at 8 p. m., on the fourth Thursday of each month.

The *Engineers' Club of Kansas City* meets at Kansas City, Mo., on the first Monday in each month.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The *Civil Engineers' Club of Kansas* holds regular meetings on the first Wednesday in each month at Wichita, Kan.

Engineers' Club of St. Louis.

The 310th regular meeting was held Sept. 21. A letter was read from Mr. William P. Shinn, chairman of a committee of the American Society of Civil Engineers, on revision of the constitution and by-laws. The letter suggested the appointment of a committee by the Engineers' Club of St. Louis to confer with the committee of the American Society concerning a basis of readjustment. The executive committee of the St. Louis Club recommended that a committee of three be appointed to confer with the American Society's committee and with committees from other clubs on a plan of union on the following basis: All local organizations to become chapters of the American Society of Civil Engineers and to have the exclusive right of electing to grade similar to the present grade of associates. Such members of the local organizations as are not now members of the American Society to become associates by their clubs entering this union. The only other grade of membership to be member of the American Society of Civil Engineers, to be elected as at present by the society at large. Mr. Russell read reports which had been made by local members of the society in Chicago and St. Louis. The sentiment is entirely favorable to the proposed affiliation. The president appointed Messrs. Robert Moore, R. E. McMath and J. A. Seddon a special committee to consider this matter and to send a representative to the proposed conference with instructions to act in the general line mapped out in the report of the executive committee.

New York Railroad Club.

A meeting of the New York Railroad Club will be held at the rooms, 113 Liberty street, New York, to-morrow at 3 p. m., for the purpose of arranging subjects for the meetings for the coming season. You are cordially invited to be present.

The Association of Railway Telegraph Superintendents.

The eighth annual meeting of this association will be held at the Ebbitt House, Washington, D. C., 10 a. m., Oct. 16. Owing to the death of the resident member at Atlanta, J. A. Lockard, it has been deemed advisable to meet at Washington.

PERSONAL.

—Mr. P. S. Stevenson, President of the New Brunswick road, died at his residence in Montreal, Sept. 8, aged 64 years.

—Mr. J. T. Fanning has been appointed Consulting Engineer of the St. Paul, Minneapolis & Manitoba, with office at St. Paul.

—Mr. M. W. Elliott, who has been Master Mechanic at Marshall, Tex., for the Texas & Pacific, has been made Acting Superintendent of Motive Power and Rolling Stock, to succeed the late H. N. Burford.

—Mr. J. T. Martin, late with the Chesapeake & Ohio, has been appointed Supervisor of Equipment for the Iron Car Co., with general charge of the rolling stock of the company, both under construction and in operation.

—Mr. A. E. Fisher, Division Engineer of the Western New York & Pennsylvania road, has been promoted to the superintendency of the Pittsburgh division of the road, to succeed Mr. Robert Bell, who has been made General Superintendent.

—Col. E. S. Bowen, formerly General Superintendent of the New York, Lake Erie & Western, has been appointed General Manager of the Rome, Watertown & Ogdensburg, to succeed the late H. M. Britton. Mr. Bowen has been Acting General Manager since last fall, when ill health compelled Mr. Britton to give up the duties of his position.

—Mr. John Loud, General Freight Agent of Through Traffic of the Grand Trunk, at Detroit, having resigned to become Traffic Manager of the Detroit, Grand Haven & Milwaukee, and Toledo, Saginaw & Muskegon roads, he has been succeeded in the former position by Mr. A. H. Harris.

—Mr. William H. Cilley, the associate of Mr. Henry Meigs in the construction of the celebrated Oroya Railroad, died on Tuesday, and was buried Sept. 12 at Lima, Peru. Leading residents of the city and the School of Engineers attended the funeral, and a great number of business houses were closed as a mark of respect.

—Mr. C. A. Parker, who, as briefly announced last week, has resigned his position as General Freight Agent of the Atchison, Topeka & Santa Fe to accept a similar one on the Missouri Pacific, has been in railroad service eight years, entering it in 1881, when he was 25 years old, as a clerk in the general freight office of the Atchison, Topeka & Santa Fe. In May, 1887, he became Assistant General Freight Agent of the road, and on April 1 of the present year he became General Freight Agent.

—Mr. John Rapelji, Superintendent of the Idaho Division of the Oregon Short Line & Utah Northern, has resigned that position and been succeeded by Mr. W. E. Green. Mr. Rapelji entered the service of the Union Pacific in May, 1887, as General Roadmaster of the Colorado Division, and four months later became Assistant Superintendent of the same division, which place he held until he was appointed Superintendent of the Colorado Division last November. Mr. Rapelji is a graduate of Stevens' Institute of Technology and has an extensive experience in the engineering department of Eastern roads.

—The announcement of the appointment of Mr. Thomas G. Shaughnessy to be Assistant President of the Canadian Pacific has gratified a large circle of friends. Mr. Shaughnessy was born in Milwaukee, Oct. 6, 1853, and before going to the Canadian Pacific in 1882 with Mr. Van Horne, he was connected for 13 years with American railroads. He became Assistant General Manager of the Canadian Pacific in September, 1885, and was one of the most active forces in bringing to a successful end the construction of that road, and his advice has been most potent in the steps since taken to expand its lines and to develop the country through which it is built.

—Mr. George O. Manchester, who recently resigned his position as Executive Secretary of the Atchison, Topeka & Santa Fe, has had a varied and extensive railroad experience. He has served successively as Private Secretary to the General Superintendent of the Michigan Central and of the Chicago, Burlington & Quincy; as Assistant General Superintendent of the latter road; Assistant General Manager of the Atchison, Topeka & Santa Fe; General Manager of the Leavenworth, Topeka & Southwestern, and Assistant to the President of the Atchison, Topeka & Santa Fe, and of the Oregon Railway & Navigation Co. In 1884 he was elected Vice-President of this latter company. Since April, 1885, Mr. Manchester has held the position he has just resigned,

being also President of the California Southern and of the California Central until recently.

—Mr. A. E. Touzalin, President of the Chicago, Burlington & Northern, died at his home in Bennington, Vt., on the night of Sept. 12. He had been in somewhat delicate health for several years, but had continued in active service with occasional brief interruptions. Although Mr. Touzalin was but 47 at the time of his death he had taken a place in the first rank of railroad officers. By his great activity he had come to be known as one of the most efficient of administrative officers, and by the clearness and justice of his mind he commanded the confidence of all who knew him well to such a degree that his services had been repeatedly sought, for high positions, by some of the greatest railroad corporations. He began his career as a clerk in the offices of the Lake Shore & Michigan Southern in 1865. For four years he was Chief Clerk in the general offices of the Des Moines Valley; later was General Passenger Agent of the Burlington & Missouri River, General Passenger Agent and Land Commissioner of the Atchison, Topeka & Santa Fe and Land Commissioner of the Chicago, Burlington & Quincy and the Burlington & Missouri River. In 1878 he became General Manager of the Burlington & Missouri River. In 1882 he was elected First Vice-President of the Chicago, Burlington & Quincy, in 1883 Vice-President of the Atchison, Topeka & Santa Fe, and in 1885 President of the Chicago, Burlington & Northern.

ELECTIONS AND APPOINTMENTS.

Baltimore & Ohio.—Robert A. French has been appointed Superintendent of the Romney branch of this system. James G. Dagron has been appointed Engineer of Bridges, with office in Baltimore.

Central of New Jersey.—P. B. Greenawalt has been appointed General Baggage Agent.

Chataqua Lake.—The following officers were elected at the recent annual meeting: O. A. Granger, President, Philadelphia, Pa.; J. M. Gazzam, Vice-President, Philadelphia, Pa.; D. H. Post, Secretary, Jamestown, N. Y.; George H. Burt, Treasurer, Boston, Mass.; J. Murray Africa, General Manager, Jamestown, N. Y.; W. E. Griggs, General Freight and Passenger Agent, and F. Bristow, Auditor and Assistant Treasurer, Jamestown, N. Y.

Chesapeake & Ohio.—George S. Sipp, formerly Car Accountant of the Cincinnati, Indianapolis, St. Louis & Chicago, and since the consolidation Chief Clerk to the Car Accountant of the Cleveland, Cincinnati, Chicago & St. Louis road, has been appointed Car Accountant of the Chesapeake & Ohio, with headquarters in Cincinnati, to succeed J. E. Mulvihill.

A. S. Emmons, Purchasing Agent, has resigned, and George Tozzer, late Purchasing Agent of the Big Four, has been appointed his successor.

Chicago, St. Paul & Kansas City.—E. O. Jones has been appointed City Passenger and Ticket Agent of this company at No. 3 Nicollet House Block, Minneapolis, Minn.

Cincinnati, New Orleans & Texas Pacific.—F. C. Smith has been appointed Division Master Mechanic at Chattanooga, Tenn., succeeding Mr. J. H. Magill.

Denver & Rio Grande.—F. A. Wadleigh has been appointed Assistant General Passenger and Ticket Agent of this company, with office at Denver, Colo.

Dexter & Newport.—The directors of the road met Sept. 12 and chose Chas. Shaw President; A. F. Bradbury, Treasurer, and Josiah Crosby, Clerk, all of Dexter, Me.

Fayetteville & Albemarle.—At a meeting of the incorporators, recently held, the following board of directors was elected: John Blue, J. W. McNeill, A. A. McKethan, Jr., H. Sutton, J. M. Hgry, A. B. Williams and N. S. Blue. The directors elected John Blue President, N. W. Ray Vice-President, Z. W. Whitehead Secretary and A. A. McKethan, Jr., Treasurer.

Fort Wayne, Cincinnati & Louisville.—W. W. Worthington having resigned, the office of General Superintendent has been abolished. The duties of the position will be performed hereafter by the General Manager. R. B. Starbuck has been appointed Master of Transportation, vice R. C. Ross, Trainmaster, transferred.

Gainesville, Jefferson & Southern.—At the annual meeting in Gainesville, Ga., Sept. 6, the old directors were re-elected, and A. D. Candler re-elected President.

Grand Trunk.—J. W. Loud having been appointed Traffic Manager of the Detroit, Grand Haven & Milwaukee and Toledo, Saginaw & Muskegon roads, A. H. Harris has been appointed General Freight Agent of Through Traffic at Detroit, Mich.

Green Bay, Winona & St. Paul.—F. E. Feetshorn has been appointed Car Accountant, in addition to his duties as Train Dispatcher, with headquarters at Green Bay, Wis.

Harrisburg, Portsmouth, Mt. Joy & Lancaster.—The annual meeting was held in Philadelphia, Sept. 6, and Directors elected as follows: Edmund Smith, George B. Roberts, Wistar Morris, N. Parker Shortridge, James Young, Lewis Elkin, A. J. Cassatt, John P. Green, Enoch Lewis.

Houston & Texas Central.—At a meeting of the board of directors of the road in Houston, Tex., Sept. 12, it was organized by the election of the following officers: Chas. Dillingham, President; E. W. Cave, Treasurer; Horace Hall, Secretary.

Marion & Indianapolis.—The Board of Directors met in Marion, Ind., Sept. 10, and elected the following officers: President, George N. Winchell; Vice-President, David Overman; Secretary, James Brownlee; Treasurer, David B. Sweetzer.

Memphis, Arkansas & Texas.—At a meeting in Memphis, Tenn., Sept. 13, the following officers and directors were elected: President, George Arnold; Vice-President, Holmes Cummins; Secretary and Attorney, George Gillham; Treasurer, C. W. Schulte; Chief Engineer, T. G. Dabney, all of Memphis. Directors, George Arnold, T. F. Duffin, S. H. Brooks, Holmes Cummins, of Memphis; N. B. Price, Mount Adams, Ark.; Parker C. Ewan, Clarendon, Ark.; Henry P. Rodgers and P. E. Matthews, Marianna.

Montana Central.—J. Herron has been appointed Engineer of Maintenance of Way with headquarters at Helena, Mont. He will have charge of track, bridges, buildings and water service.

Nashville, Chattanooga & St. Louis.—At the annual meeting in Nashville, Tenn., Sept. 11, the old board of directors and officers were re-elected for the ensuing year as follows: Directors: J. W. Thomas, G. M. Fogg, W. M. Duncan, A. H. Robinson, L. H. Lanier, Jr., and M. Burns, of Nashville; G. A. Washington, of Robertson County; Ex. Norton, T. W. Evans, of New York; Thos. Lipscomb, of Shelbyville; E. L. Jordau, J. W. Sparks, of Murfreesboro;

J. H. Inman, of New York; J. A. Aydelott, of Tullahoma, and J. D. Probst, of New York; officers: J. W. Thomas, President; J. H. Ambrose, Secretary and Treasurer; J. D. Maney, Comptroller; R. C. Morris, Chief Engineer.

Omaha, Hutchinson & Gulf.—This company has been chartered in Nebraska by William E. Hutchinson, G. A. Wulkop, B. Siloway, J. C. Cowin and W. D. McHugh.

Oregon Short Line & Utah Northern.—W. E. Green has been appointed Superintendent of the Idaho Division, with office at Pocatello, Idaho, vice J. Rapelje, resigned.

Richmond & Danville.—The General Manager has issued the following circular:

The Auditing and Treasury Departments of the Georgia Pacific, Richmond & Danville Lessee, so far as they relate to the operations of the road, will be removed to Washington, D. C., on Sept. 20, 1889. From said date all accounts pertaining to the operation of the road will be forwarded to Chas. M. Crump, Auditor, Washington, D. C., and all remittances will be made to Jno. W. Hall, Treasurer, Washington, D. C.

St. Paul, Minneapolis & Manitoba.—At the annual meeting last week the stockholders elected these directors: Sir George Stephen, Sir Donald A. Smith, of Montreal; Geo. Bliss, of New York; J. W. Sterling, of New York; Wm. Minot, Jr., of Boston; H. D. Minot, of St. Paul, and J. J. Hill, of St. Paul. W. H. Forbes, of Boston, declined a reelection, and to fill his place and the vacancy left by Mr. Marvel going to the Atchison, Topeka & Santa Fe, Messrs. Bliss and Sterling were elected.

J. T. Fanning has been appointed Consulting Engineer of the St. Paul, Minneapolis & Manitoba, with office at St. Paul.

Suffolk & Carolina.—Wm. C. Seddon has been elected President, vice Chas. F. Pitt, Jr., resigned, and W. B. Oliver has been elected Treasurer, vice W. H. Bosley.

Tennessee Midland.—T. T. Talley having resigned as Auditor, the duties of that office will hereafter be attended to by J. T. Garner, General Freight and Passenger Agent.

Texas & Pacific.—M. W. Elliott will act as Superintendent of Motive Power and Rolling Stock, with office in Dallas, Tex., vice H. N. Burford, deceased.

York & Peach Bottom.—This company having been leased to the Maryland Central, the authority of the following officers of that company has been extended over the York & Peach Bottom road. Samuel Rea, Vice-President; Charles F. Kerchner, Superintendent; Fred B. Hubbell, General Freight and Passenger Agent, and Samuel M. Manifold, Roadmaster.

OLD AND NEW ROADS.

Atlantic & Danville.—On the extension from Clarksburg, Va., to Danville the grading has been nearly completed on the whole line, and tracklaying has reached Milton. Over 1,000 men are working on the line, and it is expected to have it opened for traffic by Oct. 1.

Baltimore & Ohio.—The earnings and expenses for August, 1889 (approximated), compared with August, 1888, were: Earnings, 1888, \$1,955,450, and 1889, \$2,106,317, an increase of \$150,867; expenses, 1888, \$1,148,414, and 1889, \$1,236,525, an increase of \$88,111; net, 1888, \$807,036, and 1889, \$869,792, an increase of \$62,756. The earnings and expenses for the 11 months of the present fiscal year, compared with the same months of the last fiscal year (August, 1889, approximated), were as follows: Earnings, 1888, \$18,588,808, and 1889, \$19,196,298, an increase of \$607,490; expenses, 1888, \$13,023,824, and 1889, \$13,572,606, an increase of \$548,782; net, 1888, \$5,564,984, and 1889, \$5,623,692, an increase of \$58,708.

Tracklaying on the line to the Arthur Kill Bridge will be completed this week. The line has been built from a point one mile west of Roselle, N. J., on the Central of New Jersey, to the Arthur Kill Bridge. The distance is 5 1/2 miles, and it is all double track, except for about 3,500 ft. The bridges are of iron and steel, and the road bed will be thoroughly ballasted with broken stone.

Birmingham, Sheffield & Tennessee River.—Fudge & Strang, of Memphis, Tenn., who have the contract to build the first 26 miles of the extension from Jasper, Tenn., will start work immediately.

Canadian Pacific.—President Van Horne announces that it is the intention of this company to push the construction of a line from Cookville to Hamilton, Ont., immediately and possibly from Toronto to Hamilton. He states that the construction of the South Ontario Pacific from Woodstock to the Niagara frontier has been held in abeyance, owing to the hostility shown in the United States toward Canadian railroads, with the probable result that an attempt would be made to restrict the working of the latter. The Canadian Pacific, he says, will not undertake the expenditure of \$4,000,000 for the construction of a road through the Niagara peninsula until the policy of the United States government is understood. Last session Parliament voted a subsidy of \$3,200 for the construction of a road from Woodstock to Hamilton, for a distance of 49 miles, to the South Ontario Pacific, which company at the same time secured an extension of the time for the completion of the road within five years, and the bridge, seven years. The statement of Mr. Van Horne is somewhat at variance with the current report that the Canadian Pacific is negotiating for the purchase of the charter of the St. Catharines & Niagara Central road, in securing which it avoids the necessity of constructing the South Ontario Pacific to reach the international boundary at Suspension Bridge. Mr. Van Horne is also reported as saying: "We have decided to build a bridge for ourselves across the Niagara River. We think the policy of leasing a bridge or a right of way over a bridge belonging to some one else is a poor one, and we will therefore build one exclusively for ourselves and our own [American] connection." * * * "We have made arrangements for this connection with six leading American railroads, and will be able to run into Buffalo on the most advantageous terms."

Canada & St. Louis.—That portion of this road outside of the state of Michigan was recently sold to Henry F. Gardner, representing Chicago parties, at foreclosure sale. Last week the Master in Chancery sold to Mr. Gardner the St. Louis, Sturgis & Bay City and Battle Creek & Bay City roads, part of this system, located in Michigan. The former was sold for \$390,000 and the latter for \$180,000. It is stated that the new purchasers intend to recommence construction, suspended at the time of the failure of the contractors, the J. J. Burns Co., last February.

Cape Fear & Yadkin Valley.—The company is said to be considering an extension of its road from Bennettsville, Marlborough County, to Camden, Kershaw County, S. C., about 60 miles southwest.

Charleston, Cincinnati & Chicago.—William Kenebeck, of Kansas City, has been awarded a sub-contract to build 50 miles of this road by McDonald, Shea & Co., of Knoxville, Tenn., who have the contract to build it from Marion, N. C., to Minneapolis, Va.

Chicago, Madison & Northern.—A suit has just been instituted in the United States Circuit Court at Madison, Wis., by Drake & Stratton, railroad contractors, of New York City, against this company. The plaintiffs were the contractors who graded and constructed the line from Monroe to Madison, and they claim that the company is indebted to them about \$100,000 for work not paid for, of short measurements in grading, etc., and of work which they were forced to do in an unreasonable manner.

Chicago, Milwaukee & St. Paul.—The company has filed an answer to the complaint recently made to the Iowa Railroad Commission, which asked that the company be compelled to operate the branch between Emmetsburg and Estherville, Ia., 23 miles, which it recently abandoned. The company states that, in the eight years which it has operated the branch, it has sustained an actual loss of \$60,000, and that, as the Burlington, Cedar Rapids & Northern has a parallel line between the two points, business interests do not suffer by the abandonment of the line.

Chicago, St. Paul & Kansas City.—The company has recently completed a short branch from Eden to Wasioga, Minn., 4 miles. Parsons & Campbell, of Dodge Centre, Minn., did the grading and built the pile bridges.

Cleveland, Cincinnati, Chicago & St. Louis.—The engineers have completed the survey for an extension of the Lawrenceburg branch from Aurora to Rising Sun, Ind., a distance of eight miles, and as soon as the estimates of the cost of its construction have been made it will be decided when to begin work.

Cleveland, St. Louis & Kansas City.—Work upon the line of the road will, it is claimed, soon be resumed west of Hamburg toward Booneville, Mo. The failure of the contractors, Baird & Co., last May, caused its suspension. The road is now operated for local business between St. Charles and Hamburg. It was expected that a new contract would have been placed long before this, but financial difficulties have been in the way.

Columbus, Lima & Milwaukee.—The contract of J. E. Richards & Co., recently mentioned, is for building that part of the road between Lima and Defiance, O., 43 miles. The contract includes grading, trestling, cross-ties, tracklaying and surfacing. The contractors have opened an office at Defiance, O.

Columbus Southern.—The tracklaying on this road has been completed from Columbus southeast to Cusseta, Chattahoochee County, Ga., a distance of 20 miles, and it is expected to have the line finished to Albany, 67 miles further, by March 1, 1890. C. G. Barney, of Columbus, is Principal Assistant Engineer.

Confluence & Oakland.—This road has been completed from Confluence, Pa., to timber and mineral lands owned by the Youghiogheny Manor Land Co. on the Youghiogheny River in Maryland. The line is 20 miles long and will probably soon be continued to Oakland, Garrett County, Md., 15 miles beyond the present terminus. This would give connections at both termini with the Baltimore & Ohio.

Cumberland Valley.—The extension of this road from Martinsburg, W. Va., to Winchester, Va., a distance of 22 miles, has been completed, and through trains will begin running from Harrisburg to Winchester, 106 miles, on Sept. 23.

Decatur, Chesapeake & New Orleans.—The company was voted Sept. 10, 1887, bonds of Lincoln County, Tenn., to the amount of \$150,000, as a subscription to the capital stock of the company, provided it had its railroad completed through the county in two years. The company has for some time recently had a large force at work on the road to have it completed in the stated time. Rain has interfered with the work, and the line was not quite completed Sept. 10. The payment of the bonds is objected to as the road was not completed within the stated time. It is also objected that the roadbed is poorly constructed, and that the state act under which the county voted the bonds provides that a road must be in operation through the subscribing county from one of the termini. The company has not graded any part of the road, except that in Lincoln County. The question will come up before the October term of the court.

Delaware River & Lancaster.—Work is still in progress on this road between Phoenixville, Pa., and the Falls of French Creek. The line is to connect at Kimberton with the Philadelphia & Reading, which will probably operate it. There is talk of extending the line to Lancaster and also south 12 miles to connect with the Baltimore & Ohio.

Denison Rapid Transit.—Tracklaying has been commenced on this belt line at Denison, Tex. Grading has been finished. The maximum grade is 3.5 per cent., and there is one wooden viaduct 1,550 ft. long and 30 ft. wide. The line is 6 miles long and all within the city limits. W. Bradburn, of Marshall, Tex., is the contractor. H. H. Filley & Co., of Kansas City, are the Chief Engineers, and F. L. Miller, of Denison, is Engineer in Charge.

Duluth, Red Wing & Southern.—The company has made a proposition to the city of Duluth, Minn., to build to that point from a junction with the Eastern Minnesota, 37 miles distant. The city is asked to subscribe \$50,000 to aid in constructing the extension.

Empire & Dublin.—Over thirty miles of track has been laid on the extension to Dublin, Ga., and it is expected to have the 12 miles remaining to be built to complete the line between Hawkinsville and Dublin finished and the road opened the entire distance early in December. Next year the company intends to build an extension west from Hawkinsville to a connection with the Georgia Southern & Florida. R. S. Payne, of Empire, Ga., is Chief Engineer.

Evansville & Richmond.—The company has nearly completed that part of the road from Elmore east to Seymour, Ind., 65 miles, but little work has been done on the 70 miles from Seymour northeast to Richmond, nor has the locating survey been completed. It is now rumored that the company intends abandoning that part of the line east of Seymour, building instead northerly to Anderson, the southern terminus of the Cincinnati, Wabash & Michigan, which road it is understood the Mackey syndicate now controls.

Florence Northern.—Twenty-seven miles on the section between Florence, Ala., and Linden, Tenn., 75 miles, has been graded, and tracklaying is to commence Oct. 1. Neely, Smith & Co., of Florence, have the contract to complete the line to Linden, where it intersects the Tennessee Midland and Illinois Central roads.

Georgia.—The Covington & Cedar Shoals and Hiawasse Railroad Companies seek incorporation by the Legislature. The bill to amend the charter of the Empire & Dublin road has become a law.

Georgia Pacific.—The company has under construction nine miles of new road on three lines known as the Morrow Mine, the Red Mountain and the Fish Trap Tunnel branches. Gibson & Carpenter, J. S. Fulton & Co., and A. W. Thompson are the contractors.

Georgia & Tennessee.—A company of this name has petitioned the Georgia Legislature for incorporation. It is understood that the company is to be a consolidation of the Columbus Southern, Chattanooga, Rome & Columbus and the Georgia Midland & Gulf, the idea being to have a continuous line from Chattanooga to Florida, under one management. The Chattanooga, Rome & Columbus would have to be extended from Carrollton, Ga., over 50 miles to Warm Springs or some other point on the Georgia Midland & Gulf.

Grand Trunk.—The double tracking of this line between Montreal, Que., and Cornwall, Ont., 67 miles, is completed, and trains now pass over it regularly. The ballasting of the track west of Cornwall is proceeding, and it is expected that this autumn the track will be completed between Montreal and Brockville, Ont., 125 miles. Next spring work of doubling the line between Belleville, Ont., and Gananoque, 65 miles, will be started.

Green Pond, Walterboro & Branchville.—Colleton County, S. C., holds stock of this company to the amount of \$30,000, and is endeavoring to dispose of it. It will receive bids until Sept. 27 for the stock it holds, the purchaser to pay \$60,000 Oct. 1, 1903, with semi-annual interest at 7 per cent., and agree to extend the road 12 miles to near Bell's Cross Roads within two years.

Hartsville.—The road is now completed from a point on the Cheraw & Darlington near Darlington, west to Hartsville, S. C., 9 1/4 miles.

Harvey & Salisbury Branch.—Two surveying parties in charge of Marcus Smith, C. E., are now at work locating this branch, which is to form part of the short line between Montreal and the Maritime provinces. The line as located will shorten the distance 32 miles as compared with the existing route. Considerable work remains yet to be done in connection with the surveys testing the geological formation, etc., so as to arrive as nearly as possible at an estimate of the probable cost of the line before the government calls for tenders for construction.

Illinois Central.—The earnings for the two months ended Aug. 31, 1889, and 1888 (August 1889, estimated), were as follows:

	1889.*	1888.	In.
Miles.....	2,275	1,953	332
Gross earn.....	\$2,238,883	\$1,904,762	\$334,121
Oper. expen. and taxes.....	1,370,987	1,363,384	7,603
Perm. exp.....	23,200	19,004	4,196
Total expenses.....	\$1,394,187	\$1,382,388	11,799
Net earnings.....	\$844,696	\$522,374	\$322,322

*Including the earnings and expenses of the Memphis Division (100 miles).

The Dubuque & Sioux City Co. reports its gross earnings for the two months ended Aug. 31, 1889, and 1888 as follows (August, 1889, estimated):

	D. & S. C.	Cedar Falls & Minn.	Both roads.
Miles.....	524	76	600
Earnings.....	\$265,593	\$14,981	\$280,574
1888.....	524	76	600
Earnings.....	\$275,028	17,026	292,054
Dec.....	\$9,435	\$2,045	\$11,480

International & Great Northern.—The Attorney-General of Texas has filed an intervention at Tyler in the suit of John S. Kennedy and others against this road for foreclosure of first mortgage of about \$800,000 and in a suit of the Farmers' Loan & Trust Co. for foreclosure of about \$8,000,000 of the second mortgage bonds. The state holds that the bonds were issued without any authority of law. It asserts that the road was bought out under decree of the Federal Court in 1879, for less than \$3,000,000, and thus all the indebtedness of the road was extinguished. Since then its indebtedness in stocks and bonds has been increased by its present management to over \$25,000,000, which was not, as held by the Attorney-General, authorized by the laws of the state.

Kansas City & Beatrice.—Kilpatrick Bros. & Collins, of Beatrice, and Davis & Kelley, of Seneca, Kan., the contractors, have the grading completed for a distance of 16 miles, and the track has been laid for seven miles, and is being laid at the rate of a mile a day. The road is an extension of the Kansas City, Wyandotte & Northwestern from Summerfield, Kan., to Virginia, Neb., 22 miles. From Virginia a train will run into Beatrice, 14 miles west of Virginia, over the tracks of the Chicago, Rock Island & Pacific.

Kansas City, Memphis & Birmingham.—The city authorities of Memphis have taken possession of and partially destroyed three tracks of this railroad in that city. This action arose from a dispute over the ownership of the streets, which is claimed by the city on the one hand, and by the railroad on the other. The traffic of the road is not interrupted, although trains cannot reach the station.

Kansas City & Pacific.—This company, now leased to the Missouri, Kansas & Texas, has been granted the right of way through Coffeyville, Kan., by the city council, for the extension of its road southwest from Coffeyville, at the state line through the Oklahoma country.

Kansas City & Sabine Pass.—The Holland Trust Co., of New York, began suit in the Circuit Court at Kansas City last week against the Kansas City & Sabine Pass Co. and William Anderson and H. M. James for \$22,500, which is claimed to be due on a promissory note given on June 20, 1888, due in six months.

Knoxville & Northeastern.—The company has recently been voted a subscription of \$100,000 by Jefferson County, Tenn., to be used in building its proposed road from Knoxville west.

Little Rock Cliff.—Incorporated in Colorado by W. T. Carpenter, Charles F. Creswell, W. J. Quinn and N. N. Smith, all of Grand Junction, Col., to build a road and telegraph lines from Grand Junction to the Book Cliff and Grand Valley coal mines. The capital is fixed at \$200,000, with principal offices at Grand Junction.

Louisville & Nashville.—Contracts for building the 47 miles of the Cumberland Gap extension, from the end of the line now under contract to Princess Flats, Va., on the Norfolk & Western, were let last week to four different firms, but their allotments have not been definitely marked off as yet. The successful bidders are Winston Bros. & Co., of Minneapolis; Upper & O'Connor, of Cleveland, O.; Henry Davis, of Lexington, Va., and Mason, Gooch, Hoge & King, of Frankfort, Ky.

Louisville, New Orleans & Texas.—On the extension from Coahoma, Miss., on the main line, south 50 miles to Rosedale, work is progressing rapidly, and 10 miles of track has been laid from Coahoma south to Carson. On the south half of the line all but eight of the 25 miles has been completed. Fudge & Strang are the contractors for the north-

ern end, and Flynn & De Garis for the southern end, the latter also doing the tracklaying on the whole line.

The company is said to have engineers surveying between Lula and Greenwood, Miss., for a branch line to be built this winter between these points, work to begin as soon as the line between Coahoma and Rosedale is finished. It is also stated that next year the line will be continued from Greenwood to Yazoo City, and thence down the east bank of the Yazoo River to Vicksburg, Miss., about 200 miles south of Lula.

Louisville Southern.—The Woodford (Ky.), County Court has issued to the Louisville Southern the bonds of the county for \$60,000. Of this amount, \$15,000 was balance of subscription to the Versailles & Midway road, and \$45,000 subscribed in aid of the extension to Lexington. In all, \$95,000 has been issued.

Lower Blue Lick Springs Co.—This company has been organized in Kentucky by Thomas F. Hargis, of Louisville, and others to make improvements at the springs, including the building of a railroad from Carlisle, Ky., on the Kentucky Central, to the springs, about 10 miles, which, it is thought, will cost about \$75,000.

Macon & Birmingham.—Oct. 1 is the date now set by the officers to let the contracts for grading the first 100 miles, and for furnishing cross-ties and building the trestles and bridges. The Macon Construction Co., of Macon, Ga., has the general contracts. The company has several times heretofore announced the date at which the contracts would be let, but for various reasons postponements have been necessary.

Maine Central.—The extension of the White Mountains Division (formerly the Portland & Ogdensburg) between Fabyans, N. H., and Lunenburg, Vt., commenced May 20, 1889, is rapidly nearing completion, and on Oct. 7 next will be open for business. The White Mountains Division of the Maine Central will then extend in continuous line from Portland, Me., to Lunenburg, Vt., 111 miles.

Marietta & North Georgia.—The company has a bill before the Georgia Legislature to amend its charter, so as to permit it to build its proposed extension from Marietta to Atlanta, Ga.

Maryland Central.—The York & Peach Bottom Railroad having been leased to the Maryland Central, it is now being operated by the Maryland Central Company as part of its system.

Memphis & Charleston.—McDonald, Shea & Co., of Knoxville, Tenn., are reported to have been awarded the contract for building a new line from Stevenson, Ala., to Chattanooga, Tenn., about 35 miles. The company now uses the tracks of the Louisville & Nashville between these points.

Middle & East Tennessee Central.—The survey has been made for a line from Gallatin southeasterly to Hartsville, Tenn., on the Cumberland River, a distance of about 10 miles. The line connects at Gallatin with the Louisville & Nashville, and at Roganna with the Chesapeake & Nashville, and some changes are being made in the location at this latter point. W. H. Spradlin and J. W. Blanchard are the engineers. The headquarters are at Gallatin.

Middletown & Hummelstown.—This short connecting Pennsylvania road has been completed from Middletown, Dauphin County, to Stoverdale, 5 miles, and will soon reach Hummelstown, the northern terminus, about 2 miles from Stoverdale. H. H. Betchel & Co., of Newport, Pa., are the contractors. The road connects with the Pennsylvania at Middletown, and with the Philadelphia & Reading at Hummelstown. It will probably be operated by the latter company.

Midland Pacific.—The surveyors who started from Pierre, Dak., to survey a line of road to Puget Sound, have reached their destination, and, according to the dispatch, the engineers found the route impracticable. The dispatch adds: "Much excitement followed the starting of the expedition and property along the proposed route jumped up to unreasonable figures; expectant property holders of Minnesota and other points will now experience a sudden shock."

Missouri, Kansas & Texas.—Judge Brewer this week heard arguments on the petition of the company to have consolidated the following suits now pending in court as the same interest is involved in each: The Mercantile Trust Co. and the Union Trust Co. against the Missouri, Kansas & Texas and the Missouri Pacific; the Mercantile Trust Co., Russell Sage and George J. Gould against the Missouri, Kansas & Texas and the Union and Mercantile Trust Companies and the Missouri Pacific. The Missouri, Kansas & Texas has filed a cross-bill of complaints against the Missouri Pacific and the two trust companies, all being parties to a bill of complaint filed Feb. 8, last, against the Missouri, Kansas & Texas.

Mount Moosilauke.—Incorporated in New Hampshire by A. B. Woodworth, of Concord; B. F. Brown, of Franklin, and E. B. Mann, of Woodsville, to build a railroad up Mount Moosilauke.

Mount Penn Gravity.—This gravity road, near Reading, Pa., is expected to be in operation by Dec. 1. Tracklaying is now in progress. The road will be 8 1/2 miles long, and for 6 miles the cars will run by gravity on the return trip. The grade up the mountain for 2 1/4 miles averages 5 1/2 per cent.

Nashville, Chattanooga & St. Louis.—The annual meeting was held in Nashville, Sept. 10, and the directors were authorized to make traffic arrangements with the Lebanon branch between Nashville & Lebanon for 25 years, and with the Chattanooga & Lookout Mountain Railroad for use by that company of 2 miles of the road between Chattanooga and Cowan for five years. The following extracts are taken from the annual report submitted at the meeting. The company has purchased during the fiscal year 4 new passenger and 6 new freight engines, and had thoroughly repaired 61. Two new baggage and 22 flat cars have been built; 29 coaches and 8 baggage cars have been repaired; 707 box, 61 stock, 146 coal and 67 flat cars have been thoroughly repaired, and 204 had been changed from 30,000 to 40,000 lbs. capacity; 31 spans of new iron bridge were erected during the year, of a total length of 1,991 ft. There have been 31 miles of new 58-lb. steel rails laid during the year, replacing 52-lb. steel which has been used on branches and side tracks. The renewal of track on the Fayetteville Branch has been continued, and the entire road, with the exception of three miles, is now laid with 52-lb. steel rail instead of the old iron chair rail. A cut-off has been made at Pea Ridge, enabling trains to pull two more loaded cars over this grade than heretofore. The cost of these changes has been \$73,168. On the Duck River Branch the work of changing the gauge of this road was begun in February, 1888, and completed so that broad-gauge trains could pass over it by Jan. 1, 1889. Since that time a large amount of work has been done in improving this branch. Nine cut-offs were made of greater or less im-

portance; about three miles of it was entirely re-located, the maximum curve has been reduced from 16 deg. to 10 1/2 deg., the maximum grade from 135 to 105 ft. per mile, and the entire road laid with 52-lb. steel rail. The following shows the business done during the year ending June 30, 1889:

Gross earnings.....	\$3,300,165	
Operating expenses.....	1,951,444	\$1,348,721
Net earnings.....		
Interest and taxes.....	860,695	
Improvements.....	60,908	929,603
Surplus.....		\$418,122
Less dividends.....		333,426
Balance.....		\$14,696

For the twelve months ending June 30, 1888, the statement is as follows:

Gross earnings.....	\$3,091,653	
Operating expenses.....	1,770,248	\$1,321,405
Net earnings.....		
Interest and taxes.....	870,834	
Improvements.....	145,915	905,849
Surplus.....		\$415,556

New Orleans, Natchez & Fort Scott.—Bethune, Craney Bros. & Co., of Kansas City, and Hammet & Morris, of St. Louis, are reported to have secured the contract for building this road from Vidalia, La., to the junction with the Vicksburg, Shreveport & Pacific at Rayville, La.

New Road.—Two parties of engineers are now surveying a line for a proposed road from a point at or near Edmundston, on the New Brunswick and Temiscouata roads, to Moncton, N. B., an air line distance of about 190 miles. A third party of engineers will soon be put in the field, and it is expected the survey, with this force, will be completed in three months. The air line will be shorter between Montreal and Halifax than any other lying wholly in Canadian Territory, and it is believed that it will also prove to be shorter than the Canadian Pacific short line through Maine.

Capt. L. W. Roberts has commenced the preliminary survey for the proposed railroad from Albany to Cordele, Ga. It is expected to have it completed in two weeks.

The locating survey has been made and the stakes are now being set for a new road which is proposed to build from Trenton across the State of New Jersey in a general easterly direction to Point Pleasant, on the Atlantic Coast, where connection will be made with the New York & Long Branch road. The survey passes through Allentown and Lakewood. The line will be about 40 miles long. C. C. Vermeule, of 71 Broadway, N. Y., is Chief Engineer.

Sims & Birks, of Montvale, Tenn., propose to build a road from Maryville south about 10 miles to Montvale, Blount County, Tenn.

New York, New Haven & Hartford.—The stockholders of the company held a special meeting in New Haven, Conn., last week, and voted to accept the act of the last Connecticut Legislature amending the charter so as to allow the company to increase its capital stock to \$35,000,000. The amendment permits the purchase of the capital stock of all the leased lines, in the consolidated system, until 1900.

Northern Pacific.—Tracklaying will soon be completed on the extension of the Jamestown & Northern from Minnawaukan west to Leeds, Dak., 18 miles. The grading has been finished to Leeds, and it is stated that it has been completed for some distance west of that point also.

Ohio Southern.—At a meeting of the stockholders of the company held in Springfield, O., Sept. 11, the action of the directors in providing for an issue of 4 per cent. general mortgage bonds, and for the payment of all car trust obligations, was unanimously approved. Authority was also given for making certain extensions.

Omaha, Hutchinson & Gulf.—The company has been chartered in Nebraska to build from Omaha in a southerly direction through Douglas, Sarpy, Saunders, Lancaster, Cass, Otoe, Gage, Johnson and Jefferson counties, thence direct across Kansas and the Indian Territory to Brazoria, Texas. The capital stock is placed at \$12,000,000.

Oneida, Oneonta & New York.—The locating survey is being made for this road, which it is proposed to build from Oneida southeast to Oneonta, N. Y., about 65 miles. The preliminary survey was finished some time ago. Walter F. Randall, of Oneida, is Chief Engineer.

Oregon & Washington Territory.—Eleven miles of track has been laid from Walla Walla, W. T., to Dixie on the extension from Walla Walla to Dayton, via Dixie and Waitsburg. The extension from Fulton to Pendleton, Ore., 7 miles, has also been completed.

Ottawa & Cataraugus Valley.—There is now nearly 500 men at work on this Canadian line and construction is going ahead rapidly. There is still trouble, however, about the exorbitant prices that are asked for the right of way through certain sections of the country through which the road passes.

Pensacola & Memphis.—The officers of the company state that construction work on the line will be resumed in October. The road is projected to extend from Pensacola, Fla., to Meridian, Miss., about 183 miles, and the locating survey was finished this spring. W. W. Hungerford, of Meridian, is General Manager.

Pittsburgh, Fort Wayne & Chicago.—J. H. Forest & Co. have been awarded the contract to build the branch of the Indianapolis & Vincennes road from a point just below Gosport to the stone quarries near Ellettsville, Ind. They have shipped a lot of horses, carts, etc., to Gosport to begin work at once.

Point Arena.—This California company proposes to build from Arena Cove to a point on the north fork of the Garcia River, distant 10 miles. J. H. Smith, 1,820 Howard street, San Francisco, is Chief Engineer.

Poughkeepsie & Southeastern.—An executive committee was appointed at a recent meeting in Poughkeepsie, N. Y., to let the contract for building the road from Poughkeepsie southeast to Hopwell Junction. Edward L. Dwyer, of New York, is President, and George S. Bowen is General Manager.

Ravenswood, Spencer & Glenville.—The franchises and other property of the road have passed into the control of ex-Senator J. N. Camden. Construction work is to begin Oct. 1 on the section from Ravenswood, on the Ohio River, to Spencer, W. Va., 25 miles southeast. The road will be rapidly completed, and when opened for traffic it will be operated in the same interest as the Monongahela River and other lines which are being built by the same syndicate in West Virginia. Thomas Pettigrew, of Parkersburg, W. Va., is Chief Engineer.

Richmond, Nicholasville, Irvine & Beattyville.—Tracklaying is now in progress on this road, and nearly two miles of track has been laid. Over 1,000 men are working on the line grading and tracklaying, and it is expected to have the line opened for regular trains June 1, 1890. The grading is nearly all done on the section from Nicholasville

to Richmond, Ky., 22 miles, and work is making good progress on the section between Richmond and Beattyville, 59 miles, which has recently been put under contract. The line when completed will be an extension of the Louisville Southern, and will extend from Versailles through Nicholasville, Richmond and Irvine to Beattyville, 95 miles. Of this all but the first section from Versailles to Nicholasville, 15 miles, is under contract to D. Shanahan & Co. The right of way has all been secured except between Versailles and Nicholasville. The maximum grade is 63 ft. except in one place when the grade reaches 80 ft. where the road makes a low crossing of the Kentucky River. The curvature is 8 degrees and the work is exceedingly light considering the mountainous part of the country through which the road runs. From Versailles to Irvine it passes through the fine bluegrass country of the state, and from Irvine to Beattyville through a heavily timbered country underlain with coal and valuable ores in abundance. There are three small tunnels 675, 350 and 250 ft. long. The Kentucky River is crossed twice, once at the mouth of Bates Creek with a bridge 1,560 ft. long, a channel span of 300 ft. and flanking spans 150 ft. each. A viaduct approach at each end makes the total length 810 ft. The bridge at Irvine, Ky., will have a channel span 250 ft. long and flanking spans each 200 ft., making the total length 1,250 ft. Both crossings are 30 ft. above high water mark. One viaduct at the crossing of Marble Creek, a tributary to the Kentucky River near Nicholasville, will be 770 ft. long and 211 ft. high, and another, crossing Neal's Branch, near Marble Creek, also a tributary of the Kentucky River, will be 570 ft. long and 180 ft. high. There will be several other small span bridges, and considerable trestle work not yet planned. The bridges will vary from 60 to 200 ft. for spans; and the trestles will be from 50 to 75 ft. high, with 15 ft. stringers. The principal source of traffic will be agricultural products and coal, iron and lumber.

The company has received \$555,000 as aid voted by the following counties in Kentucky: Woodford, \$5,000; Jessamine, \$150,000; Madison, \$250,000; Estill, \$100,000, and Lee, \$50,000.

Richmond & West Point Terminal & Warehouse Co.—The following letter from the president of the company was received this week by the president of the New York Stock Exchange: "I desire to notify you that in pursuance of a resolution of the Board of Directors this company has issued \$5,000 additional shares of its capital common stock for the purpose of acquiring, by exchange or otherwise, 20,000 shares of the first preferred stock of the East Tennessee, Virginia & Georgia, said exchange or purchase to be made at the rate of three and one-quarter shares of the common stock for one share of the first preferred." This arrangement, when perfected, will put the company in possession of about \$8,000,000 of the first preferred stock of the East Tennessee, Virginia & Georgia.

Rochester & St. Paul.—Articles of incorporation of the Rochester & St. Paul have been filed in Minnesota. The proposed line is to extend from Rochester to Eden, on the Chicago, St. Paul & Kansas City line, of which it will be an extension. The line follows the proposed route of the Duluth, Red Wing & Southern.

St. Paul, Minneapolis & Manitoba.—The opinion of Judge Brewer in the case of Jesse P. Farley against James J. Hill, Norman W. Kittson and this company, filed at St. Paul, Sept. 13, is in favor of the defendants. Judge Brewer decides that the bill of complaint must be dismissed. The suit was brought to recover a fifth interest and one-fifth of the profits of the railroad. The complainant based his claim on an alleged contract which he asserted was entered into by the defendants and himself, while he was receiver of the property, and which provided that he should receive a fifth interest in the property as consideration for his services in the sale to Hill and others.

The following figures of earnings and expenses were published after the annual meeting held in St. Paul Sept. 12: Income, earnings, \$8,586,565; land department receipts, \$161,870; interest stocks and bonds owned, \$212,150; income other sources, \$539,752; profit and loss, \$139,736; total, \$9,631,075. Expenses, operating, \$4,751,475; State and Territory tax, \$248,591; interest paid and accrued, \$3,256,431; rent of lines leased, \$12,706; dividends, \$2,300,000; transferred to sinking fund, \$161,870; total, \$9,631,075. Bonds retired and cancelled by sinking fund, \$211,000.

San Antonio & Aransas Pass.—The petition of C. Kiel, a former contractor, for the appointment of a receiver, alleging as a cause the nonpayment of a promissory note for \$9,000 held by him, came up for final hearing before the court at San Antonio, Tex., Sept. 10. The court denied that the note became due before next April, and so no cause had been shown for the appointment of a receiver. He dismissed the complaint.

Savannah & Tybee.—The court at Savannah, Ga., has issued an order for the sale of the road under foreclosure, and has fixed Dec. 10 as the date. The minimum price which can be accepted is \$100,000. The road extends from Savannah to Tybee Island, Ga., 18 miles, and has been in the hands of a receiver since November, 1888.

Sheboygan & Southwestern.—Incorporated in Wisconsin to construct a line from Sheboygan to Sheboygan Falls, thence to the village of Waldo, 15 miles distant. The incorporators are Joseph G. End, James Wallmann, P. I. Kroz, A. F. Winter and Martin A. Bodenstein. The capital stock is \$100,000.

Silverton.—The branch from Corkscrew to Albany, Col., about four miles, has been completed, and the company now has a force working on the 8-mile branch from Silverton to Eureka, Col., but it is not intended to complete more than 3 miles of this line this season.

Southern Pacific.—Trains have been running over the extension of the eastern division, from Victoria to Beeville, Tex., 55 miles, for some time, but the entire line was first opened for regular freight and passenger train service Sept. 10.

Tabor & Northern.—Canfield, Fleming & Co., of Omaha, Neb., have been awarded the contract for grading this Iowa road, and are to have it completed from Tabor to Malvern, Ia., about 9 miles, by Oct. 15. The work has been nearly finished, and the bridging is well under way. Track-laying is to commence by Nov. 20. The maximum grade is 2.7 per cent. and the maximum curve is 7° 30'.

Texas Western.—It is reported that as soon as the company completes changing to standard gauge, the 53 miles of road between Houston and Sealey, Tex., it will commence work on a proposed extension from Sealey westerly about 40 miles to La Grange.

Toledo, Ann Arbor & North Michigan.—The extension from Harriette, Mich., has been completed through Sherman and Weldon to Manistee Junction, 41 miles. The line will not be extended beyond this point this year.

Tropical Belt & Gulf.—Charles F. Todd, James R. Campbell and James M. Kreamer have incorporated this

company to build a road from Cleveland, on the Florida Southern, south to St. James City, Fla., 33 miles, with a branch to Fort Myers, 10 miles.

Union Pacific.—It is stated that the company will build its proposed extension to the Yellowstone National Park from Eagle Rock, Bingham County, Idaho, which is about 65 miles southwest of the western boundary of the Park. The line has been surveyed, and it is stated that the grades are light and that no tunnels will be required.

Union Point & White Plains.—This line, which is to be operated by the Georgia road, has been completed from Union Point, Ga., on that line to White Plains, 12 miles southwest.

Union Pacific.—The following is a detailed statement of the July earnings, including the operations of the Oregon Short Line, the Utah & Northern, and the Denver, South Park & Pacific:

Month of July.	Gross earn.	Expenses.	Net earn.
1889.....	\$2,716,578	\$1,416,234	\$1,300,294
1888.....	2,554,064	1,514,068	1,029,996
	I. \$172,514	D. \$97,784	I. \$270,298

Proprietary lines, net earnings, July:

	1889.	1888.	Inc. or Dec.
Oreg. Rail. & Nav.....	\$181,109	\$172,897	I. 8,212
St. Jo. & Gr. I.....	22,236	10,377	I. 11,859
Gen. Branch.....	4,081	11,479	D. 7,398
Utah & Nev.....	1,518	6,211	D. 4,733
Ogd. & Syracuse.....	62	344	D. 282

Total.....\$209,006 \$201,348 I. \$7,658

One-half interest in other lines.....def. 3,541 sur. 1,091 D. 4,632

Total.....\$205,465 \$202,439 I. \$3,026

The statement for the whole system (6,653 miles) for July and the seven months ending July 31 shows:

Month of July.	1889.	1888.	Inc. or Dec.
Gross earnings.....	\$3,471,072	\$3,264,689	I. \$206,383
Expenses.....	1,965,311	2,032,252	D. 66,941

Net earnings.....\$1,505,761 \$1,232,437 I. \$273,324

Jan. 1 to July 1. Gross earnings.....\$20,012,431 \$20,703,801 D. \$691,370

Expenses.....12,996,144 13,386,336 D. 390,192

Net.....\$7,016,287 \$7,317,465 D. \$301,178

The percentage of operating expenses to gross earnings for the seven months was 64.9 against 64.6 for the same period in 1888, and the net earnings per mile in 1889 were \$1,054, against \$1,111 in 1888. The increase in net earnings on the whole system in July was 22 per cent., and the decrease for the seven months was 4 per cent.

Utica & Unadilla Valley.—About 150 men are at work on this New York road under W. H. Adams, of Bridgewater, N. Y., who has the contract for completing the road. About six miles have been graded and it is claimed that the road will be opened for traffic Dec. 1 between Bridgewater and New Berlin, 16 miles. The company has secured \$60,000 in local aid, voted along the route. The right of way has been obtained for eight miles.

Vincennes, Oakland City & Owensboro.—It is announced that the contract for building the road from Vincennes, Ind., to Owensboro, Ky., 70 miles, will be relet Sept. 23, at Evansville, Ind. The company has been reorganized, and Henry Watson is now President and C. W. Brantford is Secretary, the chief office of the company being in Vincennes.

Western Maryland.—It is stated that grading will begin soon on the proposed extension of the Baltimore & Harrisburg from York, Pa., to Porter's Station, 14 miles. The right of way has been obtained.

Yazoo & Delta Central.—The preliminary survey is to be commenced immediately between Yazoo City and Clarksdale, Miss., 60 miles, by Eastern parties, who have agreed to build the road if the cost of construction as ascertained by the engineers does not exceed the estimate of the local incorporators.

TRAFFIC.

Traffic Notes.

A request for a car load rate on Epsom salts was referred to the Western Classification Committee.

The Uniform Classification Committee, recently in session in Saratoga and then in New York, have adjourned till November.

The Soo line will cite the Wisconsin Central before the Commission, it is said, for dating tickets ahead to extend the time limit.

The Western Freight Association decided on a basis of 105 per cent. of the Chicago-Lake Superior rate as a proper one for St. Louis.

Rates on broom corn was reduced from St. Louis to New York from 75½ cents to 70 cents to equalize rates from Missouri River via Chicago.

A man who bought a round-trip ticket from Hebron, Neb., to Blunt, South Dak., and who died at the latter place, was sent back a corpse on the same ticket.

The Commission sat at Indianapolis, Sept. 17, to hear the complaint of millers, because corn rates from Chicago to New York are 20 cents and 25 cents on corn products.

It is reported that the Pennsylvania and Vanderbilt lines are carrying live stock from St. Louis to Eastern markets in from 24 to 36 hours quicker than when shipped via Chicago.

The Wisconsin railroads have restored the old commodity rates which were in force to and from Ashland, Steven's Point, Amherst, etc., before the St. Paul carload commodity tariff was issued.

Chairman Walker has granted the appeal of the St. Louis & San Francisco for a readjustment of differentials on grain to St. Louis made necessary by the transit arrangements now in force at Kansas City, which destroyed the local rates formerly in use.

The cases set for hearing before the Inter-state Commerce Commission, in New York Sept. 12, were settled by the parties out of court. These were Simpson & Watkins vs. Delaware & Hudson Canal Co. and New York, Lake Erie & Western; also Hoag & Titchener vs. Same, involving the rates on coal.

The rat. committee of the Southern Railway & Steamship Association adjourned without raising the cut rates \$1.08 to the old standard \$1.14 first class, between New York and common points. A number of changes in classification were made, to take effect Oct. 1. One changes unmanufactured tobacco in cases from 1st to 3d class.

The Lehigh Valley has put into effect its special rail and lake tariff, which concerns principally St. Paul and Minneapolis, and is as follows from first class down to sixth: 66, 50, 47, 35, 30, and 26 cents from New York to the points mentioned, besides Winona, Dubuque, La Crosse, Prairie du Chien, Galena, and Savanna, Ill. From Philadelphia the corresponding rates are: 60, 50, 45, 33, 28, and 24 cents.

The Southern Inter-state Association adjourned without coming to any decision on the vexed question of grain rates from Missouri and Kansas to Texas. Application having been made by St. Louis dry goods merchants for a third class rate on cotton piece goods, the whole question of relationship of cotton goods to Texas from all markets was referred to the secretary for investigation.

The Central Traffic Association's freight committee at their recent meeting recommended that rates from Michigan to St. Paul be equalized via Chicago and via Mackinaw. Also that accounting officers arrange basis of billing between Central Traffic territory and the Mississippi River. It was recommended on application of Flint & Piere Marquette, that Plymouth, Wayne, Romulus and Carlton, Mich., take a rate basis of 84 per cent.

All the Chicago-St. Paul lines are quoting the 33¼ per cent. reduction in local rates, but the 75 per cent. reduction in the proportion of the through rates will only be quoted by the Burlington & Northern, St. Paul, Wisconsin Central, Chicago, St. Paul & Kansas City and the Iowa Central, permission having been given to them by Chairman Faithorn to meet the rate, with only the legal delay in informing the Inter-state Commerce Commission. The Rock Island & Northwestern have decided not to meet the 15-cent through rate.

St. Paul Rates.

The Chicago, Burlington & Northern announces that it has arranged a through rate from New York to St. Paul, all rail, of 85 cents first class. The Lehigh Valley will quote through rates via Lakes in care of this road at Chicago, and mention is made of the Erie Dispatch doing the same on all rail. The exact arrangement said to have been made has not transpired, but it does not include the acceptance by the trunk lines of anything less than their regular rates, being merely a through quotation, leaving the Chicago, Burlington & Northern 15 cents as a proportion as before. In connection with this, this road announces a reduction in local rates. Chicago to St. Paul from 60 cents to 40 first class. By this it is hoped to escape any charge of discrimination of too great difference between local and proportion of through rates. The other Northwestern roads are reported as ready to accept this if it can be confined to the direct route between the cities.

Boston Passenger Rates.

The Boston & Maine has reduced its through fares to compete with the Fitchburg, from \$1.50 to \$2 each. The first class fares now stand thus:

	Fitchburg via West Shore	Fitchburg via Erie	B. & M. via Montreal & Norwood.
Boston to			
Buffalo.....	\$9.90		\$9.90
Detroit.....	15.95		13.50
Cincinnati.....	18.90		17.20
Chicago.....	20.00	19.00	17.00
St. Louis.....	24.25	23.00	21.00

The Boston & Maine fares, it will be noticed, are \$2 and \$3 under the Fitchburg. So far the Boston & Albany is charging the old fares, and probably will continue to do so. The Boston & Maine claims that this is not a cut in rates, but simply a continuation of the agreed differential.

Chicago, St. Paul & Kansas City.

This road has not earned its fixed charges for 1888 or 1889. A proposition is to be made to the bondholders to fund three years' coupons, till the Northwest rates again become normal. In an appeal to the Inter-state Association for a larger share of the Missouri river traffic, the General Manager presented figures to show that the Chicago, St. Paul & Kansas City, since January last, had carried west-bound 1.71 per cent. of the total tonnage and 2.57 per cent. of the eastbound; the proportions were .67 and .68 per cent., respectively.

Restoration of Train Service in Iowa.

Beginning Sept. 22, it is announced that two passenger trains each way will be restored by the Rock Island on its Harlan and other branches. To cut down expenses these trains were taken off last spring and actions were brought by the citizens living on the branch lines. The reason for the restoration, as given, is the large crops and good earnings in sight.

Wheat for Local Mills.

An extension of the milling-in-transit principle has been made by the Atchison. It is announced that from stations in Kansas, south of the Kansas Pacific, the road will receive wheat in carloads for transportation to flour mills located on the line of the road at one-half the regular distance tariff rate, with a minimum of 5 cents per 100 lbs., on condition that the mills shall ship out via the Atchison product to the amount of 75 per cent. of the tonnage of wheat shipped in. It is expected that this will prove a stimulus to the local mills.

Iowa Rate Troubles.

The Iowa merchants are complaining again, this time against the Burlington, Cedar Rapids & Northern. This road will not make joint rates with other roads at such tariffs as are as low as the proportion of through rates. How the Iowa Commissioners, with all their ability, can compel the Burlington, Cedar Rapids & Northern, a road not earning much, to accept joint freight at a proportion so small, is a question. The complaint asks further that all local joint shipments shall be billed through, and that the force at all junction points shall be increased, and last that a through freight car on the Decorah Division attached to passenger trains, shall be withdrawn.

East-Bound Shipments.

The shipments of east-bound freight from Chicago by all the lines for the week ending Saturday, Sept. 14, amounted to 50,539 tons, against 49,521 tons during the preceding week, an increase of 1,018 tons, and against 47,860 tons during the corresponding week of 1888, an increase of 2,679 tons. The proportions carried by each road were:

	W'k to Sept. 14.		W'k to Sept. 7.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central.....	5,246	10.4	4,639	9.4
Wabash.....	2,988	5.9	3,160	6.4
Lake Shore & Michigan South.	9,362	18.5	7,790	15.7
Pitts., Ft. Wayne & Chicago....	3,391	11.7	6,385	12.9
Chicago, St. Louis & Pitts.....	6,630	13.1	5,852	11.8
Baltimore & Ohio.....	3,104	6.2	2,568	5.2
Chicago & Grand Trunk.....	8,060	16.0	9,764	19.7
New York, Chic. & St. Louis....	3,357	6.6	3,482	7.0
Chicago & Atlantic.....	5,861	11.6	5,881	11.9
Total.....	50,539	100.0	49,521	100.0

Of the above shipments 2,382 tons were flour, 12,484 tons grain, 1,717 tons millstuffs, 6,055 tons cured meats, 2,074 tons lard, 9,249 tons dressed beef, 1,513 tons butter, 1,794 tons hides, 125 tons wool, and 6,068 tons lumber. The three Vanderbilt lines together carried 35.5 per cent., while the two Pennsylvania lines carried 24.8 per cent.